FOOD AND HOME COOKERY

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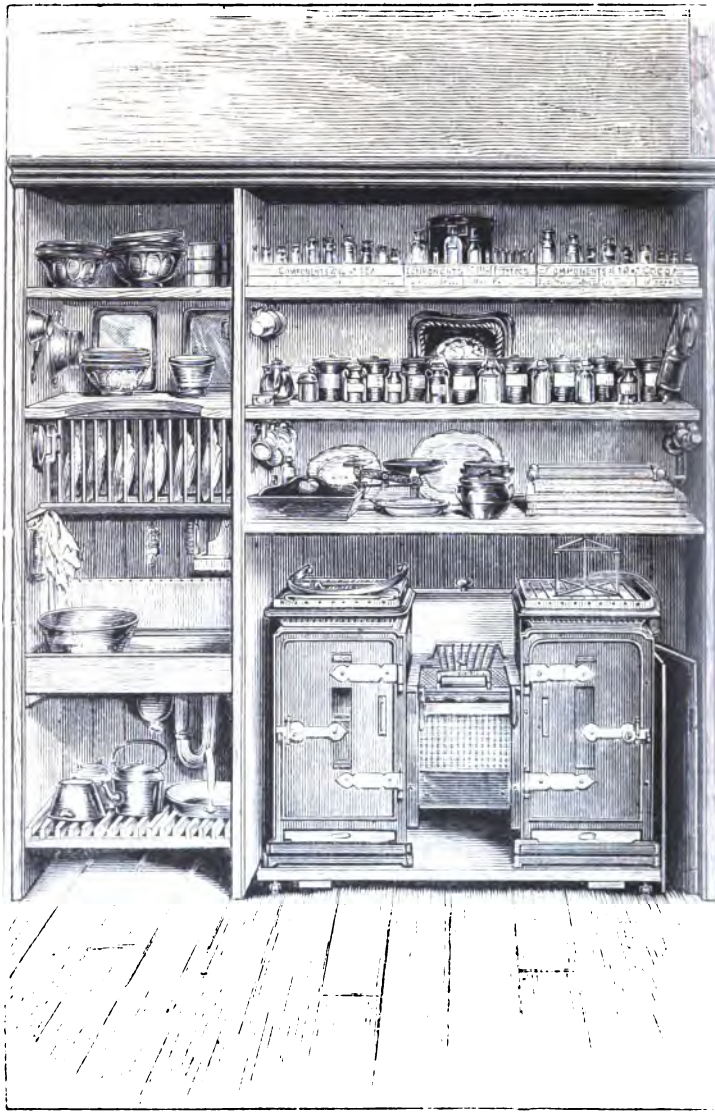

COOKERY CUPBOARD, OPEN, AND DOORS REMOVED.

FOOD

AND

HOME COOKERY

A COURSE OF INSTRUCTION IN PRACTICAL COOKERY AND CLEANING, FOR CHILDREN IN ELEMENTARY SCHOOLS, AS FOLLOWED IN THE SCHOOLS OF THE LEEDS SCHOOL BOARD

BY

CATHERINE M. BUCKTON

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PREFACE.

WHEN public money is used, an account should be rendered to the public of how it is spent. I have therefore thought it well to publish the following Scheme of Cookery, which, as the only lady member of the Leeds School Board, I have drawn up on behalf of my colleagues and myself. The aim of this Scheme was to induce a love of cleanliness, personal neatness, and order; to give *practical* instruction; and to offer every aid to the girls and their parents to practise the lessons thus taught them, in their own homes. In order to accomplish this, printed receipts easy to read were presented to the girls, to prevent their taking home illegible ones written down during the delivery of the lesson, when their attention ought to be given to observing all that the cook is doing. It has been found that the interest of the parents is much aroused by their being able to purchase at cost price small portions of the provisions which their children have helped to prepare.

The food collection, diagrams, &c., make the instruction easy and popular. Printed questions, answered at home, draw attention to the most important facts in the lesson, and are read aloud at the commencement of the lesson. Each girl is to provide herself with a writing-book, into which the

teacher gums both the printed receipts and the questions. The teacher also requests the pupil to give an account of any attempt at home cookery made during the intervening fortnight. This book may prove of great value through life, and serve as a testimonial for those girls who desire to enter domestic service. The lessons are given fortnightly, and last for one hour and a half, the course consisting of seventeen lessons, extending over one year. As forty hours are allowed during the year by the Code for 'Lessons on Food and its Preparation,' the cook may divide any of the seventeen lectures that she finds too long, and repeat twice those that are difficult. Girls attending School Board classes of cookery may have the great advantage of being able to attend them for two or three years. Lessons in cooking ought to follow instruction in the 'Laws of Health,' information on the structure of the human body, and the kinds of food necessary to preserve it in health. I cannot but hope that such instruction as I gave to our boys and girls during play hours[1] may ere long be systematically taught by a *paid* teacher in our Board Schools; in which case the one set of models and complete apparatus, used by me when giving the lectures in 'Health in the House,' would be sufficient. Our experience during the last ten months shows that the best teacher of cookery is an intelligent person who has been trained to cook, who thoroughly understands a kitchen-maid's work, and is ready to impart information drawn up for her, as in the following lessons.

I beg to draw the attention of my readers to the fact that, though in Leeds eight cookery centres will soon be provided, in no case is any special building to be erected, nor is any room expressly set apart for the purpose. The instruction is given once a fortnight in a class-room.

[1] *Health in the House.* Longmans, Green, & Co.

On page 11 a full statement is furnished of the cost incurred by the fitting up of each centre. It is not, I think, much to be regretted that we have no special rooms or kitchens, because the great care necessary to preserve cleanliness, neatness, and order in so small a space will teach lessons that must be learnt if a working-man's home, which, alas, sometimes consists of only one room, is to be kept in order and comfortable. It must be remembered that Board Schools are happily compelled to receive the poorest of the population, the class above all others that need instruction and help.

A movable gas-stove is used in our Board Schools, so placed that the cook can stand behind it, and face her large class; but in a village cooking school, where gas is not to be had, an open kitchen-range would do, provided it were fitted up with a recon and the other conveniences provided by the gas-stove.

Ventilation being so very important where gas is used, every care has been taken in our Leeds schools to secure a free circulation of air through the cupboards in which the utensils and stove are locked up. The class-room is lofty, well ventilated, has an open fireplace, and a window left open at the top. As the gas is burnt on the bunsen burner principle, the combustion is perfect. During the lesson, which only lasts for one hour and a half, the stove is placed near the open grate. Whenever a gas-stove is used in a living-room, a flue ought to be attached to the large hole at the back of the oven, and carried into the chimney. Every one should be made to understand how one gas-light uses as much fresh air as a man requires. I have lately heard of a large cooking-house in the west end of London, where between sixty and eighty gas-burners were alight without any flue to carry off the bad air! No wonder the poor cook complained of

being giddy and ready to fall down, and looked pale and ill. Her mistress said she could not think what was the matter with her.

In conclusion, I have to offer my warmest thanks to Dr. Chambers for the information and tables I found in his most valuable book on 'Diet in Health and Disease,' of which, by his permission, I have made very liberal use.

The lectures on Clothing and Diet, Yeast and Fermentation, added at the end, do not belong to the course of seventeen lectures, but contain information bearing on Foods and Cookery.

CATHERINE M. BUCKTON.

LEEDS.

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OR

AN ABSTRACT OF PRACTICAL LESSONS TO BE GIVEN DURING ONE YEAR'S COURSE OF COOKERY INSTRUCTION IN THE LEEDS BOARD SCHOOLS.

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NOTES.—No girl can gain a Government Grant in an Elementary School for any *specific* subject unless she is also examined in Domestic Economy, which includes a knowledge of foods and their preparation. The Code allows 40 school hours to be devoted during the year to acquiring the knowledge relating to *foods and their preparation* when girls have passed the fourth standard. In order to gain a practical knowledge of cooking, *the same lesson* should be *repeated two or three times.* If one hour and a half be devoted (once a fortnight during the year) to each lesson, some of the 17 lessons described above might be repeated twice.

ILLUSTRATIONS.

FOOD AND HOME COOKERY.

FIRST LESSON.

KITCHEN ARRANGEMENTS FOR A COTTAGE—REQUISITES IN A KITCHEN MAID OR COOK—DIRECTIONS ABOUT HOW TO LAY AND LIGHT A FIRE, AND CLEAN THE GRATE AND OVEN FLUES.

THESE cooking lessons which you are going to attend will, I hope, not only teach you how to cook, but how you may take care of your homes, give your father, brothers and sisters, comfortable meals, and nurse your mother or any member of your family when sick. I think you will be surprised to see how many things we manage to keep in that corner of the room where the cupboard stands. As this room is used every day as a class-room, except when it is given up to us for our cooking lessons, we are obliged to make the most of every little bit of space, be very clean, and have a place for everything, and keep everything in its place, so that all shall be neat when the children come next day.

We manage, you see, just as a good mother does who has only one room for cooking and living in. I will now open the cupboard doors and point out where everything is kept, so that you may either fetch them out or put them by. You will find that every utensil is just what you use at home, and the cheapest that could be bought good in the market. A cupboard like this would be very useful in a cottage, and very ornamental, because everything, even a spoon or cup, however common, looks pretty when it is clean and of a good, useful shape. We are obliged to have doors to lock up our

things, so that they may be all right when we come again. Doors would not be necessary in your houses. If you look on this large upper shelf you will see a row of brown jars, on which white pieces of paper have been pasted with the names written of what each jar contains. I bought them just large enough to hold what we shall use in a month. Flour, oatmeal, rice, &c., ought not to be kept too long, or mites will grow in them. The jars have lids to keep out dust as well as mites. Soap is better for keeping, so I have cut some up into pieces, and put them in that box which stands on the top of the shelf, lest it should cause the cupboard to have an unpleasant smell. I cannot now name all the utensils and foods; in time you will know them all. A list of everything is written on this piece of paper, which is pasted on the inside of the door. Meat, butter, milk ought not to be kept in such a place as this; they should stand in a cool place, through which a good draught of fresh air is constantly passing. Meat, if bought very fresh, and of the *best quality*, can be kept several days in such a larder, even in the summer, if it is washed well directly the butcher brings it, wiped *very dry*, and hung up in the draught; it should also be wiped carefully every day with a clean cloth. Green vegetables and potatoes should lie on a clean dry stone floor, where frost cannot come to kill them. You must examine the little sink and wooden rack, as it is called, just above it, where we put the plates to dry without wiping them, so that they may have a bright polish. When our saucepans are clean and very *dry*, we put them, without their lids, on to these wooden rails, with their faces down, so that fresh air can get into them and keep them sweet. Cooks often put their saucepans down on a flat shelf, so that no air can enter; the cleanest saucepan in which food has been cooked smells fusty if left with its lid on or placed in the way I have just mentioned.

Nearly all the saucepans we use are iron, without any paint on the outside or tinning inside. These pans are much cheaper than any other kind, because they are so strong that they will last for a great many years, and if scrubbed with Calais sand look better every year because they become quite

polished. It is true that if a careless cook puts them by damp, the iron rust does not look nice, but it is not in the least unwholesome, the worst thing it can do is to make potatoes boiled without their skins look dark. An excellent cook, who had lived a great many years in a house where every kind of pan was kept, told me her favourite pans were two iron ones. A French cook in Paris, who had a kitchen full of bright copper pans, told me the same thing. Saucepans that are generally used are tinned inside; now these pans are light and soon wear out, and the tinning often contains lead which poisons any food allowed to stand and get cold in them. Should the cook only half fill one of these pans and leave it on the fire to boil, the tin comes off the sides and runs down to the bottom in lumps. After a time it all comes off, and the pan is then used untinned if the person is poor. Enamelled pans that look as if they were lined with white china, though they appear so clean, may contain substances that, like lead, poison the food if allowed to grow cold in them. For this reason large manufacturers, like Messrs. Kenrick, of Birmingham, and others, have their pans examined by a good chemist, who is then able to tell the public that there is nothing poisonous in their enamel. Brass and copper pans, which last for generations, are dangerous because a poison called verdigris forms when the food in them grows cold. Do you not think it is wisest to buy iron saucepans, which are the cheapest, can poison no one, and last for a great many years? Every kind of pan is safe when used by a good clean cook, but unfortunately cooks are often ignorant and not clean. Nearly all our iron pans have bright lids. Some are to have long handles, and some have lips with round handles, so that the contents can be easily poured out and the pan hung on a recon.[1] A pan should never be put down flat on to a fire when it contains food. In country villages the cottage fireplaces generally have a recon. I went into one near Scarborough, and there I found both a recon and

[1] A recon is a hook which can be raised or lowered by putting it into the holes in a piece of iron that is attached to a swinging bar fastened to the side of the fireplace. A recon sometimes only consists of a swinging bar, on which hang some large and smaller hooks.

an iron pan,[1] and every fireplace ought to have one, or a brig[2] upon which a pan can rest.

Though we are obliged to cook by a gas stove, it is made so that we can roast meat in front of the fire as you do at home; it has an oven like yours to bake in, a recon, and an iron brig. If coals are used, nothing, I think, is so good as our open fireplaces. Some say that they also burn less coals than closed grates called kitcheners.

I will now pull the gas-stove out of the cupboard. As it is placed on rollers it comes out very easily; we will put it so that I can easily get behind it if necessary and face you all. Here are all the things I said our stove possessed, recon, brig, and oven. You can cook, as I have just said, quite as well by your own fires as by this large stove. Now that I have shown you our little kitchen, I should like to tell you how I think a little kitchen-maid or cook may manage to be clean and tidy all day long, though she has to light fires, sweep and clean the floors, and do other dirty work. You cannot be good cooks unless you are very clean and tidy. She should get up early, wash herself thoroughly, plait her hair neatly, and put it up so very firmly that it will remain tidy the whole day. Do not use coloured ribbons, as they soon get dirty; wear good thick shoes, an apron with a bib, and a dress with sleeves that can be made short; do not have the skirt long. While cleaning the fires or sweeping, cover the hair with a clean duster, or, better still, a cotton hood. A person who does all this will be well repaid for her trouble, because by simply washing her hands, when they are dirty, she will look nice and respectable to the end of the day. You must always come to these lessons with neat hair and clean hands. You will always find towels and soap ready where you hang your cloaks. Remember a cook's nails must also be very clean; by pressing the nails into the soap, and then taking the soap out by a nail on the other hand, you can keep your hands clean without a brush. Never forget to push the skin

[1] This iron pan was bought of Messrs. Waters and Woodhouse, Scarborough.

[2] A brig consists of two or three iron bars, sometimes fastened by hinges to the side of the grate, or free, so that they can be placed across the fire when required.

down gently at the bottom of the nails with the towel every morning, and then you will never suffer from those sore little bits of skin called 'stepmother's blessings;' our nails grow a little every day, and if the skin grows fast to them the nail tears the skin in trying to get free and grow. Directly your hands begin to chap, buy a small bottle of glycerine, rub some of it over your hands just before you go to bed, and then put some flour over them. In the morning you will find that they feel smooth and comfortable. You must do this before your hands get sore.

A cook and her kitchen may be very clean, but still the food she cooks will not be clean and wholesome unless the air that fills the kitchen is also very pure and clean. The air that we breathe, and that fills the room, enters all the food that is in the room; if the fresh air outside cannot get in, the room soon becomes filled with the poisonous air that comes out of our mouths every instant, called *carbonic acid gas.* This bottle is filled with this gas. If any living animal or human being could be put into that air, they would instantly die, and a lighted candle would go out directly. We cannot live in air where a candle will not burn.

[*Here show how a burning candle goes out.*]

Our bodies are wearing out every instant; the parts that wear out and die pass out of our mouths and through our skin in perspiration.

The bad air when it comes out of our mouths is hot, and is so light that it goes up to the top of the room, like the steam that comes out of the spout of a tea-kettle. Look at the steam coming out of that kettle, and watch if it does not go up. Now if you want to make bad air go out of the room, you must open the top of the window and out it will fly; it is better not to open the bottom of the window until you leave the room, because the cold wind that would come in might give you cold. Fortunately we take fresh air into our mouths every instant, which gives us health and makes our blood pure and warm. This wonderful gas that is in fresh air which makes us warm is called *oxygen gas.* Here is a little bottle filled with oxygen gas, and though it has no taste nor smell, it will make a tiny spark of heat burst into a hot flame of

fire. If we cannot get this air every instant, we first faint, and then we die and become as cold as marble. You see this piece of black stuff which looks like coal; it is called carbon. I will make a corner of this piece of carbon red hot by holding it in the flame of this candle. Now I will put this tiny spark of heat into this bottle of oxygen gas. Just see how the tiny spark has burst into a bright flame and made the bottle *very hot*. The carbon and oxygen which were in the bottle joined together and made the light and heat. There is a great deal of carbon in coal, wood, paper, and everything that will burn. The reason we put wood and paper under the coal is because they contain carbon and burn much more quickly than coal, and set fire to the coal; a fire will not burn well in a room unless it is full of fresh air, and the paper and wood will not burn unless a great deal of oxygen gas can get into the grate between the paper, wood, and coal. I will lay a fire with these pieces of paper, wood, and coal in this grate, so that no air can get between them, and then you will see that I shall not be able to make even the wood and paper burn.

The grate was used yesterday, and is full of cinders and ashes. I will not take them out, but do everything as an ignorant person would do who was going to lay a fire; put the pieces of paper flat on the top of them, and then the pieces of wood flat on the paper, and the coal flat over them on the top. Now we will put a light to the paper; it will only burn on the outside edge, but it will not burn under the wood and set fire to it. I might try all day, and for ever, but neither the wood, paper, nor coal would burn because I have not placed the paper, wood, and coal so that oxygen can get in between them. A great many people try to make fires in this way, and wonder why they will not burn. I will now lay a fire properly; the first thing I shall do is to clear out all the ashes and cinders, so that air can get through these open bars at the bottom of the grate, made on purpose to let in air. I must just put a few cinders on the bars, or the paper would lie quite flat. I shall use the same paper we had before, only I will crumple it up gently, so that some air can get between the folds of the paper. Now I will put the pieces of wood one across the other like basketwork, so that there will be holes

A KITCHEN GRATE AND OVEN, SHOWING FLUES AND DAMPER.

between the wood for air to get in, and now I will put some fresh coal and a few big cinders over the paper and wood. I need not be afraid of putting a good deal, if I do not put the pieces down flat. You will find that this fire will burn up beautifully; we will now separate the cinders from the ashes. The ash is a soft powdery substance, and contains some mineral substances, like the iron in the grate, that will not burn, only put the fire out, therefore the ashes must always be thrown away into the ashpit; but the cinders must be put on the fire, as they contain a great deal of carbon, and will burn and make a hot fire; too much paper puts the fire out, as it contains hard substances that will not burn, like iron. It is wasteful and wicked to throw *cinders* into the ashpit. I am afraid cinders are often wasted in this way. Ignorant people sometimes waste their time in trying to make *ashes* burn, but they might just as well try to make the iron bars of the grate burn and take fire.

Directions about the Use of a Damper and the Cleaning of Oven Flues.

A great deal of food, as well as time, is often wasted because people do not understand how to manage or regulate the heat of an oven and clean the oven flues. I hope by means of this coloured picture of a common kitchen grate and oven, to teach you how to do this. Of course you have all seen your mothers push hot coals under the oven from the kitchen fire through a hole at the side of the oven, when they wanted to make it hot for baking bread or any food. You can see the hole in this picture marked H, the red-hot coals lying under the oven, and flames of fire coming from them passing up the side and over the top of the oven into a chimney at the back of the oven, which is hidden, but dots are drawn to show where it is. This small chimney is called a flue, and makes the back of the oven hot. In the picture you can also see the flames passing up this flue from the hot coals until they come to a hole in the side of the kitchen chimney, marked O, through which they pass to join the smoke from the big kitchen fire, and fly up with it out into the fresh

air. You must particularly notice in the picture that the coals under the oven are burning red and making no smoke; they do so because plenty of fresh air is entering by the hole at the side of the oven to feed the fire and flames. An oven such as we are looking at is a square iron box, placed or set in a bigger square box, so that a space is left under the oven for a fire, and at the side and top for plenty of air and the flames to pass round. These places are called flues. The fire and flames would die out directly if no fresh air could get into the bigger box, just as the flame of a candle would go out if put into a box or bottle that was covered up to keep out the air. A cook can put out the oven flames and fire by shutting this little door that is just above the oven in the flue, marked D. This door in the picture is pulled out as far as it will come, so that the flames can escape into the kitchen chimney. This door is called a damper, and when pushed quite in reaches across the chimney and prevents any air from passing to the fire and round the oven. When a cook wishes to make the heat of the oven less, or damp it, she pushes the damper in a little way, so that there is less room in the chimney for air to pass through, and therefore less heat is made and the oven grows cooler. By experience she learns how to manage the damper and make the oven just the heat she wishes. If the flues are not kept clean, soot of course would fill them and keep out the air. When the oven is no longer wanted for baking, the damper should be quite pushed in, and the little door shut at the side of the oven through which the hot coals are sent. In some ovens this hole is closed by putting a piece of iron over it, called an end-iron. When this door and the damper are left open the kitchen fire will often not burn bright, because the fresh air in the kitchen rushes in round the oven and up through the open flue instead of going into the kitchen fire to mix with the coals and fan the flames.

I must now tell you how to clean the little chimneys or flues round the oven, and the flue behind the oven, because they ought to be cleaned once a week, particularly in cottage houses, as these flues are often made very narrow. The most difficult flue to clean is the one at the back where the damper

is. The damper must, of course, be pulled out before you begin to clean, or you could not get anything to pass down to the bottom under the oven where the fire will be. If a brush is used it must be very long and narrow like a bottle-brush, and have a long bent handle so that the brush can be put through the hole at the side of the kitchen chimney, and be pulled up and down by the handle. An old servant of mine who has a nice cottage home, says she cleans this flue by a long chain tied to a stick. She puts the chain through the hole at the side of the grate and pulls it up and down by the handle, and finds she can send the chain into all the corners, as well as hear when it touches the bottom. The soot falls, of course, where the hot coals will lie under the oven, and must be raked together and sent out through the hole that goes into the kitchen fire. An old toasting fork with a string and a weight at one end, surrounded by straw, does very well.

The flue at the top of the oven is cleaned by pushing a stick or iron rake through a little door in front of the oven, marked S. Now we have to clean the side flue farthest from the fire. There is a hole on the top or at the side of the oven through which an iron can be put to clean this part. A woman told me the other day that while cleaning this flue the iron fell down and she never expected to see it again, but to her surprise she raked it out when she was removing the ashes and cinders from under the oven; these ought always to be cleaned out every morning when the grate is cleaned, and before the kitchen fire is lighted.

I will now show you a real oven and grate in a kitchen belonging to the school-keeper's house, and then I hope you will understand all I have said.

I wish you would all save your pennies by putting them into a penny bank until you have saved enough money to buy a complete set of under clothes, cotton dresses, shoes, and all that you would require to keep yourselves neat, either at home or in service. I have a list of all these things, the price and patterns of the cheapest materials, as well as the patterns of the best shapes in paper to lend you, and also one of

each of these articles which I have had made, so that you might see how nice they look. The French girls, even the poorest, possess, by the time they go out, a large stock of underclothing; they consider it a disgrace to have a torn petticoat and poor shoes and stockings. I think the plain strong shoes I have chosen are far the best. Laced boots or button boots take a long time to fasten, and boots with elastic are very bad indeed, because the elastic soon wears out, and then they look very slatternly; unless a person has tidy feet she cannot look nice, however good her clothes may be. I hope soon to see every girl in our Board Schools at Leeds devoting her sewing hours to preparing such an outfit, instead of employing her time in making small doll specimens for the annual examination by the Government Inspector.

Things required for First Lecture.

Bottle of carbonic acid gas.
Bottle of oxygen gas.
Piece of charcoal, called carbon, fastened to a wire, to put into the oxygen.
Large piece of charcoal.
A candle.
Kettle with boiling water to show how steam or hot air goes up to the top of the room.
No. 9 Sheet.—Carbonic acid gas.
No. 10 Sheet.—Oxygen gas.

Girls to copy the names of these two gases.

Questions[1] *for First Lesson.*

1. How do you think a kitchen-maid or cook could dress, so that she might keep herself neat and respectable all day in the midst of her work?

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[1] Printed copies of Questions are placed in the hands of the children after every lecture. Answers to these questions are brought by the children at their next lesson, the following week, in their stiff-cover exercise books, sufficiently large for their answers over the whole course; and are examined and marked by the Instructress, and returned to the school for the children the following day. The marks are cast up and small prizes are awarded at the end of the year.

Printed copies of the receipts are also given to the girls as they occur at the fourth and subsequent lectures, and are pasted into the exercise

2. How would you lay a fire so that it would burn up quickly when you wanted to light it?
3. Before laying the fire what would you do with the cinders and ashes left in the grate? Would ashes burn if you were to throw them on the fire?
4. Why do the flames made by the burning coals that are poked under the oven fly up the side and over the top, and up into the kitchen chimney directly the little door called a damper is pulled out, and why do the flames and the heat in the hot coals die out when the damper is shut or quite pushed in?
5. How would you take out the ashes and cinders that are pushed under the oven from the fire, and how would you clean out the soot that collects in the side, the top of the oven, and the small chimney through which the flames pass into the brick kitchen chimney? Why must the oven shelf which takes out be well scrubbed with sand like a saucepan?

The following is the sample outfit recommended to the girls in the lecture, with the price and quantity of material required for each article:—

	£	s.	d.
Dress, 7 yards at 5½*d.* per yard	0	3	2½
Lining	0	0	3½
Buttons	0	0	4
Tucker	0	0	2½
Best twill piping, ¼ yard at 1*s.* per yard	0	0	3
Total cost of dress	£0	4	3½
One Woollen skirting	0	2	0
„ Flannel petticoat, 2½ yards at 11¼*d.* per yard	0	2	4
„ Band got off calico			
„ Chemise, 2¼ yard at 3¼*d.* per yard	0	0	8½
„ Drawers, 1¾ yard at 3¼*d.* per yard	0	0	6
„ Flannel vest, 1¼ yards at 1*s.* 3*d.* per yard	0	1	7½
„ Apron with bib, flax or harding (5*d.*)	0	0	5
„ Holland apron, ¾ yard at 7½*d.* per yard	0	0	6
„ Hood, 1 yard of print and piping cord	0	0	6
„ Stays	0	2	6
„ pair of Stockings, woollen	0	1	6
„ „ Shoes, hand-made	0	6	6
	£1	3	4½

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books along with the questions. In this way a ready and permanent record of the complete course of instruction is provided for each pupil for reference by her in future years.

The following is a detailed enumeration of the Cookery Apparatus with cost of first outfit for one centre:—

	£	s.	d.
One cooking stove, two ovens, and roasting fire-place, complete with all necessary fittings and roasting jack	14	0	0
Other Cookery utensils, including baking boards, pans, store tins, and pots, &c., for keeping cookery materials	2	11	0
Cost of cupboard	8	0	0
	£24	11	0

In addition there is cost of bringing to class-room water and gas, fitting up of sink lined with lead, and repairs to room, varying from £5 to £10, according to arrangement of room, &c.

Dimensions of Cupboard.

From floor to top 7 feet.
Width for store 4 feet 9 inches
„ for sink 2 feet 6 inches } = 7 feet 3 inches.
Three shelves 22 inches broad.
Tables 2 feet 4 inches broad, 3 feet 6 inches long, 2 feet 4 inches high.

List of Utensils required at each Centre contained in Cupboard.

One soup pan.
Three saucepans.
One gridiron.
„ frying-pan.
„ iron kettle.
„ bottle jack.
„ stand and wheel.
„ strainer.
„ colander.
„ dredging box.
„ flour box.
„ pepper box.
„ grater.
Three bread tins.
Four paste boards.
„ rolling pins.
One potato crusher.
Four metal teaspoons.
„ „ forks.
One thermometer.
„ feeding bottle.
„ small steamer.
Two meat dishes.
Six dinner plates.
One hastener.
„ dripping tin.
„ Yorkshire pudding tin.
Four wood and iron spoons.
Ten knives.
Four forks.
One knife box.
„ milk jug.
„ salt cellar.
Ten basins, yellow.
„ jars.
Three tumblers.
Two washing-up bowls.
One zinc pail.
„ soap box.
„ roller, for towels.
Four kitchen cloths.
Six dishcloths.
Two blacklead brushes.
„ scrubbing brushes.
One hand brush.
Two baking sheets.
One wooden bowl.
„ sugar basin.

List of Utensils (continued).

Six pie dishes.
„ pastry dishes.
One teapot and tray.
Three teacups and saucers.
One slop basin.
One China cup and saucer.
One tray cloth.
„ flower vase.
„ tray.
„ small coffee pot.
Scales and weights.
Mincing machine (lent).

Teaching Apparatus.

Diagrams, being tables of foods, general directions, salient facts, &c., in large type on mounted sheets, which are to be used at all the centres, 6*l.* 15*s.*

List of the above.

1. Drawing of yeast plant.
2. „ starch cell.
3. Coloured drawing of oven, flues, and grate.

Sheets.

4. Directions about clean hands.
5. Table of the substances in the juices of flesh.
6. Carbonaceous foods called 'body warmers.'
7. Nitrogenous foods called 'flesh formers.'
8. Wet foods, green vegetables and fruit.
9. Table of digestibility of eggs.
10. Carbonic acid gas.
11. Oxygen gas.

Component parts of foods, in stoppered bottles, which are used at all the centres, 2*l.* 15*s.*

List and Prices.

		s.	*d.*
Components of	Beer	4	6
„	Flour	6	0
„	Beef	8	6
„	Tea	8	6
„	Cocoa	8	6
„	Milk	7	0
„	Potato	7	6
„	Egg	4	6

Teacher's salary is 90*l.* per annum, which will be divided over the various centres, at first probably 10 in number, subsequently 20.

The gas stove burns about 100 feet of gas per hour when every burner is alight. The average quantity burnt at each lesson, which lasts for two hours, is 100 feet, and costs 3*d.*, because gas is 3*d.* per 100 feet in Leeds.

The teacher can give every week one lesson at each of 10 centres. The cooked foods are readily bought by the children, or by teachers who come some distance to school, at about the cost price of the material. The weekly loss on the food for the 10 lessons does not exceed 2*s.*

SECOND LESSON.

CLEANING.

LIST OF COOKERY UTENSILS TO BE WASHED AT THE LESSON.

Wooden Utensils.—Table tops, pasteboard, rolling-pin, wooden spoons, and bowls.

China.—Dinner plates, dishes, and milk jugs.

Tea-things, tray, glass, meat-mincing machine, and iron kettle.

I HAVE written the names of the kitchen utensils we are going to clean to-day on the large slate over the mantelpiece. A cooking utensil means anything that will hold food, such as a basin; or anything upon which we prepare food, such as the top of the table; or anything that helps us to prepare food, such as a rolling-pin or mincing machine.

For cleaning all these things we only use plenty of hot and cold water, a scrubbing-brush, and some Calais sand that costs about 2*d.* per pound (a pound lasts a long time). Our dishcloths, tea-cloths, and dusters are all made of the same material, harding, which only costs 5*d.* per yard; three quarters of a yard makes a towel. We never use soap to clean any kind of cooking utensil. I hope you will never do so; because though soap is a very good thing to take away dirt from our hands and clothes, it is a very nasty thing to eat. Now, when soap is used to wash a table top or any sort of cooking utensil, it is almost impossible to wash it all off so completely that not a bit shall remain in any corner. Wood sucks up a great deal of water and the soap too that is in the water; if you make paste or chop parsley, &c. on the wood, the soap will surely come off and get into the food. We use soda instead of soap. Soda, like soap, is very fond of grease and sucks it all up directly it touches it. We always put some soda into the water in which we wash tea-things, or any utensil that has contained milk, or any kind of food, because there is some grease in every food, though we cannot see it.

Soda would take off gold, but none of our china has any gold, I am glad to say; if it had we should have to use a little soap.

Directly we have used a dishcloth, pudding-cloth, or any cloth, we wash it in clean hot soda and water, rinse it well with plenty of cold water, and then pull it out straight and hang it out to dry, so that every part of the cloth can get plenty of fresh air or oxygen gas. Oxygen gas makes everything pure and sweet. You know how much sweeter clean clothes smell that have been hung out to dry in fresh air than those which have been dried in the house. You must remember that unless every utensil a cook uses is perfectly clean and sweet, the food that has been cooked in it will not be wholesome or taste nice. I have seen a dirty cook in a good house wash all her plates, dishes, and dishcloth in only one water, without rinsing them at all.

Now here you will have to wash everything in at least two waters, and be taught that nothing can be clean unless it has been well rinsed in clean water.

As there are twenty girls, I have arranged five separate places at each of which four girls will stand and do their work. You will each clean one wooden utensil, one or two china plates belonging to a dinner-service, some china that belongs to a tea-service, also an utensil that has held milk. When you have been taught how to clean one wooden utensil you will know how every wooden utensil should be cleaned. If you know how to clean a china plate you will understand how to clean a whole dinner-service; if you can clean a cup and saucer you will know how to clean glass and all that belongs to a tea-service, because glass is cleaned in the same way. If you can clean any utensil that has held milk you will know how to keep every dairy utensil sweet and clean.

All our wooden utensils are cleaned as follows:—About a tablespoonful of crushed soda is put into the hot or cold water that is to be used, to wet the table-top, pasteboard, rolling-pin, or whatever the utensil may be; some Calais sand must then be sprinkled all over the table, and then scrubbed well with a scrubbing-brush. After the top of the table has been well washed and rinsed, every bit of grease will be

removed, the wood will look white and be so sweet that any food can be prepared upon it.

We wash a dinner-service in the following way:—First put about a tablespoonful of crushed soda into a tin bowl, pour boiling water over it, put in a dirty plate, wash it well with a very clean and sweet dishcloth, and then put it into another tin bowl of hot or cold water. Should you have no second bowl, hold the plates one after another under the tap, put them into a rack like ours (which is over the sink), or let them rest one against another until they are dry; you will then find they have a beautiful bright polish. Never wipe a dinner-plate, or it will look greasy and not clean and bright.

The tea-things must be washed in soda and water as hot as the hand can bear, and washed by the hand, particularly round the outside where we drink; they should then be well rinsed in cold water and wiped dry with a clean cloth. Glass is washed in the same way, and wiped dry and rubbed until it is very bright. The commonest plate, cup, or glass is an ornament to a room when it is perfectly clean.

Now about milk jugs. Every utensil or feeding bottle that has held milk requires to be most carefully washed. Directly the milk is taken out boiling water should be poured in and allowed to stand in it for at least five minutes. Little *germs* that float in the air are very fond of milk, and get into it, feed upon it, and turn it sour. These little germs are too small to be seen by the naked eye. A thousand of them can live in a single drop of water or milk. They like warm or cold water, but water that quite boils at 212° kills them directly. Now this is the reason why I said that the boiling water must stand a few minutes in the jug so that it may kill any germs that are in the corners. Babies who drink sour milk die of bowel complaints, because these little living germs in the sour milk get into their blood and poison it.

At the end of the lesson you shall watch and see how I clean a mincing machine and a feeding bottle. Every part of a mincing machine must be taken to pieces when it is cleaned, and it must be cleaned directly it has been used; if the least morsel of old meat is left in a little corner all the fresh food will be quite spoiled. The best feeding bottle is the old-

fashioned one, like this, that has a short teat over the mouth when the infant sucks. This teat can be taken off and put into boiling water, and the bottle can have a little soda and boiling water poured into it. It is impossible to clean a feeding bottle with a long pipe, because boiling water cannot get inside the pipe and into every corner to kill the germs that live in milk.

Directions.—Questions to be read aloud before the lesson.

Each girl should find her place and work arranged.

One table ought to be kept quite free to receive each utensil when it is cleaned.

All dirty utensils are to be sorted and kept quite distinct in one part of the room.

Questions for Second Lesson.

1. How would you clean milk-jugs, basins, or any utensils in which milk has been kept?
2. How would you wash dinner plates and dishes that had no gold upon them, so that they should have a bright polish?
3. How would you wash tea-things which have no gold, and glass?
4. What is the cheapest and sweetest way of cleaning table-tops, paste-boards, rolling-pins, and all wooden utensils? Why ought a cook never to use soap?

THIRD LESSON.

CLEANING—continued.

Tin and iron utensils.—Saucepans and lids, gridirons, spoons, dripping pans, cake-tins, oven-shelves, colanders, tin milking pans, flour dredgers.

Clean sink, brass tap.

Knives and forks, brass and copper pans, and tea-kettles.

Metal ware.—Spoons and forks.

We will read over the list of the utensils we are going to clean to-day. Tin and iron utensils are all cleaned with hot water, soda, and Calais sand; soap should never be used. Copper and brass pans and kettles are cleaned with the same materials that are used in polishing knives and forks—Bath

brick and a leather. German silver utensils are made bright by whitening and a leather. One of our pans is new; I will show you what must be done to it before it can be used. I shall fill the pan with cold water, then put in two tablespoonfuls of bran and hang the pan on the recon, or place it where it can gradually come up to boiling point, then let the bran and water simmer for two hours; the inside of the pan will by that time have become beautifully smooth and ready for use. Some cooks have a dirty habit of letting soup or the water in which meat has been boiled remain in their pans: this water should never be wasted or thrown away, but poured directly, before it is cold, into a perfectly clean jar and kept until the next day, to be used as soup or broth. If any kind of food remains in a brass or copper pan, a poison forms, called verdigris, and whole families have been poisoned by eating this food; it is even dangerous to allow food to remain in saucepans that are tinned inside, because lead is sometimes mixed with the tin, and the lead mixes with the cold food and forms a poisonous substance.

Before you begin to clean anything I wish to show you why it is necessary to clean the outside of all saucepans as well as the inside. Saucepans often get covered with soot, and so become dirty and make the cook dirty too. Soot also prevents the heat of the fire from passing quickly through the pan into the water or food. The water in a kettle that is clean on the outside boils more quickly than one covered with soot. I will prove this by putting some soot over the centre of my hand and a small boiling tea-kettle on the top of it. You will find I shall be able to hold the boiling kettle there for a minute, because the soot will not let the heat in the kettle pass through into my hand. I hope you will not try this little experiment yourselves, because it requires great care and my kettle is very small and light; I could not hold a large, heavy one.

We will now wash the inside of the pans. Pour boiling water into them, with a little soda; if there is any burnt fat at the bottom you must rub it off with a small piece of flannel and Calais sand; never scratch it off with your nails as some little kitchen-maids do, and so wear their nails down to

the quick. Now you must wash the outside, and then put the pan under the tap and rinse it well both inside and out; do not wipe it, only turn it down and place it over these rails, where plenty of air can enter it. The lids must be washed, just as we washed the pans, in hot water and soda, and then rinse them well under the tap. Do not wipe them, only hang them upon a hook or nail, and you will find that when they are dry they will not only be very clean, but have a bright polish.

A sink should be very carefully cleaned with a scrubbing brush, hot water, and soda; you must remember that the opening through which the water runs goes into the large drain, and that a short way down the pipe there is a little bend which holds about a cupful of water. The water in this cup gets quite bad and impure if bits are allowed to go down through the hole into the pipe. The first thing to be done, therefore, is to collect all the little bits on the sink, put them into a basin with all the potato parings and any tops of vegetables there may be, and neatly throw them on to the hot ashes *under the grate*. Cover them over the top with the hot ashes, so that the heat from them may burn the bits. By the time you have washed up, and want to make up the fire and clean the hearth, these bits will not smell when you throw them with the cinders on to the back of the fire, but will burn like cinders. People should never keep a swill-tub unless they have an outhouse. If a wooden tub is used for washing up it ought to be put in fresh air, and not under the sink; tin bowls are the best for washing up in, as the grease does not sink into them as it does into wood. I sometimes see dish-cloths, and brushes, and pots put under the sink; but that is not the place for them. Living germs, that are always floating in the air, though we cannot see them, settle in anything that is damp or greasy, and make it smell fusty, and cause a mould to grow. Mould is a collection of living germs.

We are now going to clean knives. If great care is not taken in washing knives and forks, the handles come off. Careless cooks will put the handles into boiling water as well as the blades; the blades only should be placed in a jug of hot water and soda, just deep enough to cover the blade, the

handles should afterwards be dipped into some clean warm water and be well wiped. When the knives have been made bright on a knifeboard, the handles should be nicely wiped, so that all dust is removed; nothing is more disagreeable than a dusty or dirty knife-handle. Coffee pans and kettles should be washed inside and out with soda and water as the knives are, and then be polished on the outside with a piece of leather and Bath brick powdered very fine. German silver utensils should be well washed with plenty of hot water and soda, and polished with leather and whitening. A very good cleaner uses very little whitening, Bath brick, or any polishing powder, as it gets into the corners and makes the utensil look dirty instead of clean.

It will be seen by the list given of the utensils at each centre that it is impossible to have a sufficient supply of dirty utensils for twenty girls to clean. The cook rubs a little grease inside the cleaned part and some soot on the outside if she has not a sufficient number.

Required—A small kettle of boiling water.

Questions for Third Lesson.

1. All the following cooking utensils are cleaned in the same way:—Iron and tin saucepans, gridirons, dripping pans, cake tins, oven shelves, iron spoons, colanders, tin milking pans, saucepan lids, and flour dredgers. Describe how you would clean them.
2. Why must the outside as well as the inside of a saucepan always be cleaned?
3. How ought a sink to be cleaned? Where must any bits of food be put? Why is it very unhealthy to keep a swill tub under a sink, or in any living room?
4. How would you make knives and forks quite clean, and afterwards give them a bright polish, and prevent the handles from being dusty? When you know how to clean and polish knives you will know how to polish brass and copper pans and kettles, as they are cleaned with the same materials.

FOURTH LESSON.

COOKERY.

Bread Making.—The use of scales, and how to measure certain quantities by kitchen utensils instead of scales—Dough to be baked into cakes and bought by the girls.

THIS is our first lesson in which we begin to cook food. You must remember that it is only by practice that you can learn to do anything perfectly. It is impossible for you to get sufficient practice at school to make you perfect; this practice I hope you will get in your homes, as all the foods prepared here ought to be eaten in every family, if the members of the family are to be strong and healthy. In order to help you to practise at home, receipts will be given you of what you have cooked, so that your parents may understand them and provide you with all you require for cooking. I hope you will always answer the questions, which are to be given you after each fresh lesson.

Whenever you have been able to practise at home any of the cleaning or cooking taught at the class, give a faithful account of how you succeeded, or if you failed in your attempts. I can assure you that such answers will be read with the greatest interest by the Members of the Leeds School Board. The food you cook during your lesson is to be divided into portions that will be sold to you at the end of the lesson for 1*d.*, 2*d.*, and 3*d.* I told you at the last lesson on cleaning that at your lesson after this one, you would make bread and buns, so that to-day you can tell me whether you would like to buy any. I shall by this means know how much bread to make, and how many buns will be required. There will then be no waste and you will have more practice.

I recommend you to try and keep a cheap little basket like this, which costs only 2*d.* If a piece of felt, such as this, which is half-a-yard, is doubled and wrapped round the basin the food it contains will be kept nice and warm, be-

cause felt will not let the heat escape. Felt is very cheap—1*s.* 2*d.* a yard. A quarter of a yard will be enough.

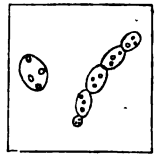
Let us now read what is written on the slate over the mantelpiece, and then you will know what we are going to learn to-day——Bread-making—Yeast—Weighing.

Read also what is said about clean hands and nails. I see your hands are very nice indeed. We will now make the dough, and while it is rising I will give you some information about yeast, flour, and weighing. In each of the ten bowls that are placed round the table there are 6 oz. of flour, and in the piece of brown paper by each basin there is ¼ oz., rather less than half a teaspoonful, of brewer's yeast or German yeast (the same quantity is required of either kind). Make a little hole in the middle of the flour (not quite to the bottom, or the china is seen, and the yeast would stick to it); sprinkle a very little salt round the dry flour, put the yeast into the cup or mug by your side, and mix a tablespoonful and a half of the water that is placed in the two jugs on the table. First feel the water with your finger, and if it is lukewarm, like new milk, it is the right heat. Watch what I do and then copy me. Mix the water and yeast together, then pour it into the hole just a little at a time, so that you can mix the water and flour together gradually until it has all been made into dough. Now knead the dough well, and keep turning the outer edges into the middle; it is almost impossible to knead dough too much. When none of the dough sticks to your fists, you may give up kneading. Cover the top of the basin with a clean cloth and put it near the fire, but not so near as on the fender, where there is a draught. After about an hour the top of the dough will begin to separate and look like honeycomb; it will then be ready to make into a loaf and put into the oven to bake. Cooks often let the dough stand until it separates a second time on the top, when the weather is not very hot. Dough sucks in air, just as a sponge sucks in water. The air in this room, which has entered the dough, is pure because our windows are open at the top and the room is sweet and clean. Bakehouses are often filthy places, and the bread will also be very dirty, though it looks all right to the eye. At the next lesson the ten youngest girls shall

make the same quantity of dough. The quarter of a pound of flour will make a little roll that we mean to sell for a halfpenny; it would be a penny at the shops. A quarter of a pound just makes a tea-cake. Now the dough is rising.

Yeast is a most wonderful substance. Every cook ought to know its history; some of you may know it. Lest there should be any here who do not, I must describe it as shortly as I can. German and brewer's yeast are the same substances; the only difference between them is that the German is dried and comes from Holland, and the brewer's is fresh and is bought at any brewery in Leeds. Yeast is a plant, and looks like a little bag when seen through a magnifying glass. You may fancy how tiny it is when 30,000 will only cover a square inch; no wonder we cannot see them, though the air is full of them. In this picture you can see them. They grow one out of another like the soap bubbles that you blow out of a pipe. In one teaspoonful of brewer's yeast there will be several thousand little yeast plants. They cannot grow without food; they grow very quickly on sugar and water; and while they are growing they make a great deal of air, which we call carbonic acid gas. When the yeast is mixed up in the flour it feeds on the sugar there is in the flour, and fills the dough with air bubbles, that lift (or rise, as we say) every part of the dough. When the yeast plant has eaten up all the sugar it can find in the flour or dough, the dough becomes sour. In the winter the dough can be allowed to rise twice, but in the summer once is enough and then the dough should be baked. The little yeast plant is quite still and will not work in cold weather. Boiling water kills it, but warm water, such as you mixed with it, makes it grow very quickly. You must look through the little window in the oven door. Directly the dough is put in you will see how the little plant enjoys the heat and grows so fast that the top of the dough rises and swells up. In about five or ten minutes the poor little thing will be killed by the heat in the oven, which to bake bread well ought to be as great as boiling water, and it will then cease to work—a good thing

FIG. 1.



Yeast Plant (magnified).

too, or the bread would be full of air-holes. You shall be taught how to bake bread in the lesson after next. The yeast plant is like a tiny little egg which is spoiled if it is crushed. Cooks can keep the yeast plant alive by feeding it on sugar in the summer time when it is scarce. Just look at the brewer's yeast in that jug, how it is growing and working. If you were to put it into a bottle and cork it up, it would soon push the cork out and send it flying to the other side of the room, or it would burst the bottle. This dried yeast is also working away because it has found something to feed on in the warm water.

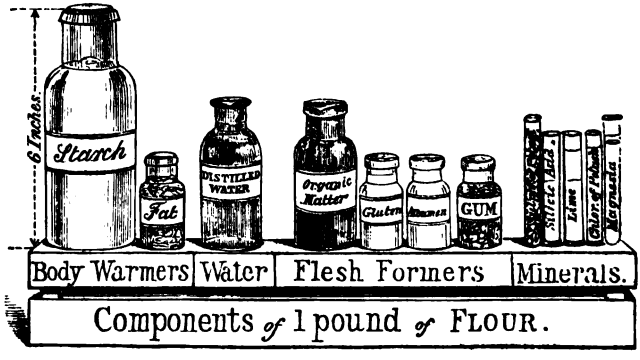
I will now tell you which kind of flour is the most nourishing and the best to buy, and mention the names of some of the principal things flour contains; they are clearly written down on the sheet on the wall:—

'Albumen makes our flesh, nerves, and muscles.

'Starch only makes our fat.

'Phosphorus, lime, and gelatine. These three things are the only substances that will make our bones hard and strong.'

FIG. 2.



The bottles which are placed on this stand contain the water and the quantity of each of the principal substances that could be taken out of one pound of flour. We will examine them. Here is albumen or gluten, that makes our flesh, muscles, and nerves; here is the starch which makes our fat; the lime, phosphorus, and gelatine which make our bones

grow strong and hard. All children (except babies) who have cut all their teeth should eat a great deal of bread daily, because it will make their bones grow hard. If a child's bones are not quite hard before it is seven years old, they will never be strong, and its legs will be crooked and weak.

The starch in flour is exactly the same starch your mothers use to stiffen your fathers' shirt collars and fronts. I wish you to notice that starch is a very white substance. The whitest and dearest of flour, called best, costs 2½*d.* per pound; this flour is chiefly starch, and though the bread that is made of it looks very white it is not very nourishing, because the starch only makes fat. Albumen, phosphorus, gelatine, iron, and lime, which feed our muscles and nerves, and make our bones strong, are dark-coloured substances, and make the flour less white. This darker flour is called seconds, and costs only 2*d.* per pound. You can see the difference in their colour, as I have some of each kind in these two bottles. I hope you will always buy seconds, because it is not only more nourishing, but it has a sweeter flavour. Flour is the most nourishing of all *vegetables*; flour is a vegetable food because it comes from wheat that grew in the ground. Every food that has grown in the ground is called a vegetable. You must remember this fact, or you will not understand what I shall tell you during the cookery lessons about the different kinds of food.

I shall begin the next lesson by showing you how to weigh out the exact quantity of flour and yeast you require for the dough.

There are sixteen ounces in a pound, eight ounces in half a pound, and four ounces in a quarter of a pound. Every pound of flour requires one gill of water to mix it into dough of the right stiffness, and half an ounce of yeast to make it rise, and a quarter of a teaspoonful of salt. You must always put the salt in when the flour is quite dry. All families do not possess a pair of scales, but a cook can manage without them if she takes the trouble to find basins, mugs, and spoons that hold certain quantities. For instance, this basin exactly holds a pound of flour, this basin half a pound, and this cup a quarter. This jug holds one pint, and this small mug a gill. A tablespoon holds one ounce.

Articles required.

No. 4 Sheet.— Clean hands, &c.
No. 6 Sheet.—Principal component parts of bread.
Food collection of component parts of one pound of flour.
No. 1 Sheet.—Picture of yeast plant.
Samples of the whitest flour.
„ of the seconds flour.
German and brewer's yeast, in two tumblers.
Kettle of boiling water. Pour some of the water into one of the tumblers of yeast, to prove that the yeast plant is killed by that degree of heat. Pour a little tepid water into the other tumbler, to show how that heat makes the plant *grow*.

Questions for Fourth Lesson.

1. How would you know when your dough had risen enough before putting it into the oven to bake? Why ought bread to be made in a clean room filled with good air?
2. Every kind of food that grows in the ground is called a 'vegetable.' Is flour a 'vegetable'?
3. There are two kinds of flour. One kind is very white, the other is not so white, and is called 'seconds.' In which kind of flour do we find the most of the following things:—Albumen, that makes our flesh, muscles, and nerves; starch, that makes our fat; lime, phosphorus, and gelatine, which are the only three things which make our bones grow strong and hard?
4. How can you tell the yeast plant?

Receipt for Fourth Lesson.

Bread Cakes.—6 oz. of flour or 6 tablespoonfuls, ¼ oz. or half a teaspoonful of German yeast, a pinch of salt, about two tablespoonfuls of either water or milk just lukewarm, then let it rise for ½ hour, and bake ½ hour.

FIFTH LESSON.

COOKERY—continued.

USE OF THERMOMETER—BREAD-BAKING—TEACAKES, BUNS, SEED AND CURRANT CAKE.

As your lesson only lasts for an hour and a half, it is not possible to teach you how to make bread and how to bake it in one lesson. I have, therefore, brought a small quantity of

dough which I made at home, that is nearly ready for baking. I kept it as warm as possible in my little basket with this piece of felt; still, for fear that the little yeast plant may have been chilled by being carried through the cold air, I will cover the basin over with a clean cloth and place it on a chair near the fire, where there will be sufficient warmth to make the yeast grow.

While the yeast plant is working I will try and explain to you the use of the thermometer which I hold in my hand. By this instrument we can find out how many degrees of heat there are in the water or food when it is being boiled on the fire, or how many degrees of heat the oven contains. You see we measure heat by *degrees*, not by *pounds* or *ounces*, as we measure flour and food. If we apply too much heat or hot air to food we burn it; and if we apply too little, the food is not cooked enough. Bakers in Paris and Vienna, where the best bread in the world is made, have thermometers in their ovens which tell them exactly how much heat the oven contains. The air in an oven ought to be at 410° of heat when the dough is put in. We have a thermometer in each of our oven doors. The thermometer I have in my hand is for putting into water or any food. It is, you see, a long glass tube with figures on it, the bottom figure is 1° and the top 500°. Between each figure there are little dark lines; the space between these lines is called a degree. At the bottom of the pipe there is a glass ball filled with a white substance called *quicksilver*, because it looks like silver and moves very quickly directly any heat touches it. My hand is warm. I will, therefore, put it over the ball of quicksilver, and you will see how the heat from my hand will get into the quicksilver and make it warm, cause it to swell, and rise up very quickly through the pipe. When the quicksilver stops I shall look at the figure on the dark line opposite to which it stops, and then I shall know how hot my blood is, or how many degrees of heat it contains.

We will look at the thermometer on the oven door. The ball with the quicksilver is placed inside the oven, so that the hot air in the oven can touch it. The little white line of quicksilver has risen up, you see, to 410°, and there it stands.

We must now put our dough in directly, or the oven will get hotter and spoil our bread. Before we put it in I must teach you how to find out the heat of the oven for baking bread without a thermometer, as very few ovens possess one, I am sorry to say. I shall sprinkle this pinch of flour on the bottom of the oven; if it becomes a nice brown colour in a minute, the oven would be just the right heat; but if the flour turns black, the oven is too hot, and if it does not become a nice brown, then there will not be heat enough to bake the bread. You see this flour has browned very nicely in a minute. I wonder whether you would put the bread on the top or the bottom shelf of the oven. As the air is the hottest at the top, the dough would be quite spoiled if you put it there, because the heat would fall down on the top of the dough and bake the top so hard that the dough would not rise. At the end of ten minutes you will find by looking through this glass window that the heat in the *bottom shelf* has entered the bottom of the dough, made the yeast plant grow, the starch cells in the flour swell, and sent the water which was in the dough out through the holes we pricked with a fork on the top of the dough. Water weighs very heavy, and, if not driven out, would make the bread when baked very heavy; dishonest bakers know this, and put their loaves on the top shelf first to harden the top crust and prevent the water from getting out, and so get more money, as they sell the loaves by weight. Directly a loaf of bread is taken out of the oven it should either be placed down on its side or on the top crust, so that the water or steam that still remains can get out at the bottom of the loaf, which is not so hard as the crust. As the loaf we have just put into the oven is only a small one, it must be put on the top shelf in ten minutes. A pound loaf should remain a rather longer time.

We are now going to make some currant buns, seed buns, and teacakes. To make all these we must have four pounds of flour, half a teaspoonful of salt, four ounces of dripping, one egg, German yeast $\frac{1}{4}$ ounce, half a pint of milk, which must be lukewarm, a small teaspoonful of carraway seeds, a quarter of a pound (or four tablespoonfuls) of currants, four ounces of sugar. Currants ought to be very carefully washed.

as they are very dirty, and have little bits of stone which might break the teeth; they must also be very dry before they are put into the flour, or the water if left in will make the cakes heavy. I should wash raisins, dates, figs, and all dried fruits, because they often contain mites, and are very dirty. Cooks wash a pound of currants or more at a time, and put them when clean and *dry* into the jar, so that they may be ready when they are wanted. I have divided one pound into ten portions, so that ten girls can learn how to wash them at this lesson, and ten at the next. They must be washed in two cold waters, then made as dry as possible, and put by the fire. Now eight girls shall have half a pound of flour. The salt must first be sprinkled into the dry flour, then the dripping be rubbed in, and sugar and currants or seeds added; the egg ought to be broken into a basin first, to see whether it is a good one. After it has been well beaten, the yeast and milk should be added, and all mixed gradually with the flour until a smooth paste is made, which must be well kneaded and allowed to rise for twenty minutes; the cake should then be made into either buns, teacakes, or currant loaf, and put on a tin. Before the cakes are put to bake in the oven, they must stand before the fire to rise again for a few minutes. The tins in which the loaf or teacakes are baked must first have a little dripping rubbed in them to prevent the cake from sticking to the sides.

Required—A thermometer.

BREAD, BUNS, TEACAKES.

Cost	s.	d.	Sold.	s.	d.
Monday	1	0	Monday	1	0
Tuesday	1	0	Tuesday	1	0
Wednesday	1	0	Wednesday	1	0
Thursday	1	0	Thursday	1	0
Friday	1	0	Friday	1	0
	5	0		5	0

	s.	d.
Money expenses	5	0
Money received	5	0

Bought and sold for one week; the following week the same. Each girl had a penny bun, which just covered the expense of the flour, yeast, and

milk. They were very much larger than those sold in the shops. In the second week of bread-making, we put in for a change currants, seeds, and one egg, with a little lard. These buns were also sold for a penny each.

Questions for Fifth Lesson.

1. How would you find out when an oven was the right heat for baking bread if you had no thermometer?
2. Why will a loaf of bread be sad or heavy if it is first put on the top shelf in an oven, instead of being first put for about ten minutes on the bottom shelf?
3. How would you make a bun or teacake with or without currants, also a seed or currant loaf?

Receipts for Fifth Lesson.

CURRANT BUNS, SEED BUNS or TEACAKES.—2 lbs. of flour, ½ a teaspoonful of salt, 2 oz. of dripping, 1 egg; German yeast ½ oz.; half pint of milk (lukewarm); small teaspoonful of carraway seed or 3 oz. of currants; 3 oz. of sugar.

The currants should be very carefully washed and dried.

ROCK BUNS.—Melt in a basin 3 oz. of butter or dripping (do not make it too hot), stir in 1 lb. of flour, ¼ lb. sugar (3 oz. of currants or an ounce of seeds, which you like best), 1 oz. of candied peel. Whisk 2 eggs to a froth. mix half a gill of milk with the eggs, then work the whole together and bake in a moderate oven.

SIXTH LESSON.

COOKERY—continued.

BOIL AND POACH AN EGG—GRILL A MUTTON CHOP OR BEEF STEAK—BOIL POTATOES—EGG SANDWICHES.

TO-DAY you are to learn how to cook an egg in its shell, and how to poach one, so that the white part shall be soft and well done, without a clock to tell you how many minutes these eggs have been in the water; how to grill a mutton chop on a gridiron so that none of the flavouring matter, called osmazome, shall escape, or any of the gravy or juices run out; and how to boil some potatoes.

The eggs and mutton chop are both animal foods, and the

potato is a vegetable food. There are some people who think that they only take animal food when they eat beef, mutton, pork, poultry, game, or fish, but they also eat and drink animal foods when they take eggs, milk, butter, cream, cheese, dripping. suet, lard, cod-liver oil, because all these foods are taken from animals, and are therefore animal foods. There are also persons who think that they only take vegetables when they eat potatoes, cabbages, or any green stuff that grows in a garden; but a vegetable is anything that grows in the earth, such as corn (which is ground into flour and made into bread), oatmeal, rice, sugar, &c. When you have been taught how to cook one kind of animal food you will soon learn by practice how to cook all animal foods; and when you have learned how to cook a potato you will soon learn in the same way how to cook every kind of vegetable. The great art of cooking is not to let any of the good things that each food contains get out and be wasted during the cooking, and to make the food tender, so that our teeth can chop it up. Before we cook an egg we will find out what the principal things are which an egg contains by examining the contents of these bottles that are placed in this stand. Albumen, &c.

As these substances are dried you must not expect to find that they will have the same colour as they would if they were in the fresh food, or be as large in quantity; the most important substance is albumen, because it nourishes our nerves, flesh, and muscles. It is made hard and indigestible for delicate stomachs when cooked in boiling water. Water boils when the quicksilver in the thermometer rises to 212°, as I will prove to you by putting this thermometer into a kettle of boiling water. You know that a kettle is boiling when the steam pours out through the spout as it is now doing. If we were to let the kettle boil a little longer, all the water would be changed into steam and fly up the chimney, and the kettle would be left empty and burn. Remember that all foods when they really boil at 212° are being changed into steam and fly up the chimney. The French people are the best and most economical cooks in the world; the first lesson a French girl is taught by her mistress is to cook every food gently and

well. The English are the most wasteful and worst cooks in the world, because they do not understand anything about the nature of the food they cook, and because they think that if a saucepan with food is put on the fire and boils away they have done all that is necessary. If you read what is written on that sheet on the wall, you will learn at what degree of heat food should be cooked, which is about 180°.

We will now put the thermometer into a kettle of boiling water. You see the quicksilver has risen to 212°, called boiling point. The quicksilver will never rise any higher in boiling water, because water cannot be made any hotter than boiling heat. We will now put the thermometer into this pan of water that is hanging on the hook, or recon, over the fire. You see the quicksilver rises and stands till opposite the figure 180°, that is called simmering heat, and is the right heat at which animal and vegetable foods should be cooked. Now we will put the thermometer into this little pan of water that stands on the brig; it is, you see, also at simmering heat, 180°. You would find that if you were to let a pan of water boil on the fire and then put it on the hob or on the top of your oven at home, the food in the pan would keep simmering at the right heat, 180°. Two or three pans with food can be safely cooking at the same time when they are put on the hob, or where the food will not boil and spoil. A cook need not then be in a fright or fuss lest her dinner should be spoiled, because she is not obliged to watch the saucepans every instant. I have seen a very large dinner beautifully cooked by a fireplace exactly like those in your houses, which had only a small open grate, an oven on one side, a small boiler on the other, and a recon over the fire on which a large saucepan with a round handle like ours could hang. The food in these pans was first boiled on the fire for about five minutes before the pans were put on the different places I have named to simmer. The cook began to prepare the dinner early, and therefore allowed nearly twice the time for cooking each food.

Before we cook an egg I will show you a raw one, so that you may see how the albumen, or white part, looks before it is cooked, and then you shall see a hard boiled egg that has

been boiled for five minutes in boiling water, so that you may compare it with an egg that is properly cooked without being boiled at 212°.

I will put this pan of water on the fire to boil. Directly it really boils I shall take the pan off, and instantly put this fresh egg into the water, cover the pan with a lid to keep in the *steam*, and put the pan on the fender. When the egg has remained in the water for about five minutes, as far as I can guess, I shall take it out, because you remember we are not to look at a clock. A stale or a bad egg, like bad meat, cannot be made to look right, however you may cook it. As about five or six minutes have now passed, I will take the egg out and just break the top for you to see how creamy and nice the white looks, and that it is just stiff enough. The white part of an underdone egg looks slimy and disagreeable.

We must also poach an egg in the same way, that is cook one without its shell. I have an egg all ready in this cup. Directly the water quite boils I will take the pan off the fire, slip the egg in, put on the lid, and let the pan stand for about five or six minutes on the fender, which is not quite cold; a hob, recon, or brig would be too hot. An egg cannot be cooked in this way by guess, unless the saucepan has a lid to cover up the top and keep in the heat and steam.

The mutton chop and potatoes we are going to cook are for a delicate person who has a poor appetite, and wants a very tempting little dinner that can easily be digested. If everything is not very hot, our little dinner will be spoiled. A mutton chop or beefsteak ought to be carried straight from the fire to the person who is to eat it; the plates must therefore be put where they can get hot, and we must get the tray ready, cover it with this little white cloth, see that the salt-cellar is clean and filled with clean salt, and that the tumbler is very bright, the water fresh, and everything as nice as it can possibly be. As a mutton chop will be cooked in a much shorter time than the potatoes, I put two potatoes into this saucepan just before you all arrived, so that they might be ready when the chop was done. Before we cook the mutton chop I must tell you that mutton is animal food and contains albumen and the same substances that are

to be found in an egg. I must also remind you that the great art of cooking is not to let any of the good things that each food contains get out and be wasted, and to make the food tender so that our teeth can chop it up. This fine chop is full of juice and albumen. We must let the heat of the fire be so great that it will instantly harden the albumen that is on the outside of the meat so that the juices cannot run out. The fire must be very hot and the coals all red, not black and smoky; a black fire sends out too little heat to harden the albumen quickly, and the smoke that comes from it would make the chop taste of soot. Our gridiron, which is only a thick iron one, must be put on the fire to get warm before the chop is put on to it, or the raw meat would stick to the cold iron bars. Some cooks have a dirty habit of rubbing grease over the bars, but you must never do this, only make them warm. We will now put the chop on the gridiron with a spoon and knife; take care never to stick a fork into a chop or beefsteak, or the juices will run out of the holes made by the fork. A fine large chop will be well cooked in twelve minutes if it is turned every two minutes, and eighteen minutes if it is turned every minute; a small chop will take about ten minutes if turned every two minutes; at the famous chop house at Barnsley the chops are turned every minute and take twenty minutes. A chop when properly cooked in this way will be full of gravy and ought to be eaten with a hot potato and a little pepper and salt; never put butter on a chop or gravy in the dish. If any of you would like to buy a chop next week, and two potatoes cooked in their skins, I could let you cook the chop and also prepare the potatoes yourselves; the chop and potatoes will cost 4*d*.

Now that our chop and potatoes are done, I will teach you how to wash potatoes and cook them. Potatoes and all vegetables must be washed in cold water, but not allowed to stand in it; great care should be taken that all the dirt is got out of the holes; a clean old scrubbing brush takes it out best. Two potatoes were all we wanted to-day; never boil, as some careless cooks do, more than are wanted. Potatoes should always be boiled in their skins, because there is a corky substance in the skin of a potato which prevents any

water from entering the potato, and also prevents any of the juices and good things from getting out. The two potatoes must be the same size, because a large one would take more time to cook than a small one, and they would not be ready at the same time. They should be put into a pan of boiling water, and after they have boiled for about five minutes on the fire, the pan should hang on the recon and the potatoes cook until they are tender; the potatoes should have plenty of room in the saucepan and be well covered over with water.

I will now boil the two soft-boiled eggs I cooked at the beginning of the lesson, until they are hard, and then make sandwiches, as we must not waste them. Hard-boiled eggs make excellent sandwiches for people who have a strong digestion, prepared in the following way: cut some slices of bread and butter, chop up the white and yolk of the hard eggs into very small pieces, and add salt and pepper to taste; when all is well mixed up spread the egg with a spoon over the bread and butter, and then put a slice of bread and butter over the minced egg.

Egg sandwiches are very good and nourishing food for people who go long journeys, and for teachers to take as part of their lunch.

Required for Lesson.

Component parts of an egg.
Sheet with the effect of heat on albumen and the proper heat for cooking.
A thermometer.
Kettle with boiling water.
Pan with water at 180°.

Questions for Sixth Lesson.

1. How would you cook a fresh egg, or poach one, so that the white part (called *albumen*) should be soft and well done, if you had no clock to tell you how long the egg had remained in the water?
2. How would you cook a mutton chop or beefsteak on the gridiron as that all the gravy and juices should be kept in, and the meat be tender and tempting for a delicate stomach?
3. How would you boil a potato or any vegetable?

Receipts for Sixth Lesson.

How to cook an Egg without boiling it.—Let a pan of warm water thoroughly boil. As the pan is lifted from the fire have an egg ready in the hand to put in, and instantly cover the pan to keep in the steam, place it on the warm fender and let it remain for four or five minutes, when the egg will be done. A poached egg is done in exactly the same way.

Grill a Mutton Chop or Beefsteak.—Place the chop on a clean warm gridiron, with a knife and spoon, so that no holes are made in the flesh to let out the gravy; the gridiron must first be warmed or the chop will stick to the bars; the fire ought to be very bright and red, and the chop turned once every two minutes. A large chop takes twelve minutes and a thin one about ten. A beefsteak is cooked in the same way.

Egg Sandwiches.—Boil an egg until it is quite hard, chop fine, add a little pepper and salt to taste, cut two slices of bread and butter, put the chopped egg on one slice and cover over with the other, then cut the slices into convenient sizes.

SEVENTH LESSON.

COOKERY—continued.

ROAST BEEF—YORKSHIRE PUDDING—CABBAGE OR CAULIFLOWER.

Before we roast beef I must let you look at the contents of these six bottles, which contain the principal substances to be found in one pound of beef—albumen, osmazome or flavouring matter, &c.

We will now weigh the little joint, which is a piece of thin flank. As it weighs 1½ lbs. it will take three quarters of an hour to roast, because we allow nearly half an hour for each pound when there is a great deal of gristle and bone in the joint (a quarter of an hour is the usual time). People do not generally consider this a good joint, nor many others that have a good deal of bone and gristle, but they would not think so if they had once eaten such joints when they had been well cooked. Our butcher tells me that it is quite sad to see how women come in a great fuss and ask for something that can be cooked quickly before their husbands come home, and

COOKERY LESSON.

The *third table* is not shown here. The cupboard holds every utensil and all the things represented in this picture.

therefore cannot buy the good, cheap joints that should have been cooking for him for a very long time, so that they might be thoroughly done. A breast and shoulder of mutton ought to have the same time, and then they are excellent. Now that the meat has been weighed, we will wash it by dipping it into this pan of very hot water, and then dry it. All butcher's meat should be washed in the same way before it is cooked, because it often comes from a dirty slaughter-house and is carried in dirty carts or on the heads of butchers' boys. The meat is also sometimes wrapped in newspaper, and the newspaper sticks so fast to the meat that it cannot be all removed unless it is washed off. Newspaper is covered over with ink, which contains some poisonous substances, and therefore ought never to be used to wrap up or cover any kind of food. A friend of mine told me that he once had a calf's head for dinner upon which he found small pieces of newspaper. Butchers are sometimes injured by even handling diseased meat. Though some professed cooks will tell you never to wash meat, they do wash it themselves with the dripping with which they baste the joint while it is roasting. If the meat is boiled it is made clean by the water in which it is cooked. This water is kept and made into soup, for it should never be thrown away and wasted.

Dripping ought to be very clean, as it is used for pastry, frying, &c., and a Yorkshire pudding is always placed under the meat to receive some of the dripping. Before we hang the joint in front of the fire we must see that our fire is bright and red, so that it will send out a great deal of heat to harden the albumen on the outside of the flesh, and so keep in all the juices, gravy, &c. The joint should be placed very near the fire for the first ten minutes, and then be removed to about a foot, with a screen put partly around it to prevent the cold air from carrying off the heat. I wish you particularly to notice that raw beef has none of the good odour or smell which comes out while it is roasting, fills the air of the kitchen, and makes your mouth water if you are very hungry. The substance that causes this peculiar odour is called osmazome: it is a very delicate substance, because too much heat spoils it, and a certain quantity of heat is necessary to bring

it out. This flavouring matter helps people to digest their food. Roasting is the most wholesome way of cooking meat, because if it is properly done the outside of the meat can be hardened so that the juices and osmazome cannot escape; and if a kitchen is well ventilated, has plenty of fresh air brought in from the top part of an open window, so that there will be no draught at the *bottom* of the room, the oxygen in the fresh air will constantly pass into and through the meat which is roasting, mix with any burnt fat on the outside, and change it so that it will not be unwholesome and indigestible when eaten. You see how important it is that a kitchen oven or any place where food is cooked should have a good supply of fresh air. The fat on the outside of our joint is beginning to melt; we must therefore baste it by pouring the melted fat or dripping over the meat. The hot fat will help to cook the meat, prevent the meat from burning, and keep in the juices, &c.

It is now time we washed the cabbage. The outer leaves which do not look quite fresh must be taken off, a piece cut off the stem, and two deep cuts made in the shape of a cross down into the heart of the leaves, so that the cold water and salt it is washed in can get among the leaves. The salt will kill any grubs, and they will fall out into the water. Children have had tapeworm from eating raw or unwashed greens. After the cabbage has remained in the water and salt for about five minutes it must be rinsed in another cold water or be held under the tap. We will not crush the cabbage up in a small saucepan, but put it into one that is sufficiently large, filled with boiling water and a little salt and soda to keep the green colour. The cover of the pan can be left on. When the pan with the cabbage has boiled about five minutes on the fire, it shall hang on the recon and remain there until the cabbage is quite tender.

After the Yorkshire pudding has been made I will tell you why all vegetables grow bigger while they are being cooked. We do not cook our vegetables half long enough in England, and they are therefore considered indigestible foods. The French and Germans eat nearly double the quantity of vegetables that the English people do, and they do not suffer as

much as we do from stomach complaints. When a vegetable is taken out of the saucepan, it ought to have all the water squeezed out by being put into a basin called a colander, and a plate should be placed on the top to press your hands on to squeeze out the water. If a colander is not to be got, the cabbage can be put into a potato-steamer, with a plate on the top to press out the water. The water must be got out by some means. Take care never to throw the water in which a cabbage has been boiled down the sink, because the house will then be filled with a bad smell, which tells directly that the cook is a very careless person. Cabbage-water should be thrown on to the ash-pit.

Receipt for Yorkshire Pudding—Ingredients.—1 gill of milk; 2 tablespoonfuls of flour; 1 egg and a pinch of salt. Put the flour and salt into a basin as for bread, make a hole in the centre, and gradually stir enough of the gill of milk to make the flour into a very *smooth paste*; break the egg into a basin; when it has been well beaten, add it to the paste and the remainder of the milk. The whole pudding should then be mixed up very quickly together, and poured into the hot greased tin and put on the bottom of the oven for three minutes; then place it under the roast meat for one hour. About 1 oz. of dripping should be put into the tin and left to bubble, when it will be the time to pour in the batter. The lightness of the pudding depends a good deal on this.

Roast meat that is of good quality ought to contain enough gravy, and should not be sent to the table with any made gravy in the dish. Gravy is good to the Yorkshire pudding, and can be sent by itself.

While the dinner is cooking I will tell you why all green vegetables swell when they are cooked. I have brought all the principal substances that are found in one pound of potatoes, and amongst them you see this large bottle filled with starch. This starch is like common starch used to stiffen linen. If you could see a little of it through a microscope you would find that it was made of little bags or cells such as you see drawn in this picture. Directly these little starch cells become hot they swell and grow much bigger, as you

can see by this picture, which shows you the comparative size of a cooked and uncooked starch cell. When you have seen how much starch there is to be found in one pound of potatoes, you will know how much there is to be found in cabbages and all green vegetables.

Apparatus, &c., Required.

Component parts of 1 lb. of beef.
Component parts of 1 lb. of potatoes.
No. 2 Sheet, picture of starch cells.

Foods to be Cooked.

Joint.	Egg.
Flour.	Cabbage,
Milk.	Dripping.

Suggestions to the Cook.—If there is too much information for one lesson, some part of it could be reserved for the practice lesson the following week.

The Cost of Dinner and how it was Sold.

	s.	d.
Cost of meat, 1½ lb.	1	0
Do. pudding	0	1½
Do. cabbage	0	1
	1	2½

Sold for four girls' dinners, at 3*d.* each—meat, pudding, cabbage divided into equal portions.

The girls were very much pleased with their dinners.

Questions for Seventh Lesson.

1. Why ought all meat to be dipped into hot water and wiped dry before it is either roasted or boiled? Why is it both dirty and dangerous to wrap up food in newspaper?
2. How would you roast meat so that all its juices and flavouring matter, called osmazome, should be kept in the meat and not run out into the dripping pan?
3. A Yorkshire pudding is made of flour, eggs, and milk. Tell me which of these foods are animal and which are vegetable foods?
4. Whenever you have been able to practise any of the cooking taught at the lesson, give me a faithful account of how you succeeded, and also how you failed in your attempts.

Receipts for Seventh Lesson.

YORKSHIRE PUDDING.—1 gill of milk; 3 tablespoonfuls of flour; 1 egg, and a pinch of salt. Put the salt and flour into a basin as for bread, make a hole in the centre, and gradually stir enough of the gill of milk to make the flour into a very smooth paste; break the egg into a basin. When it has been well beaten, add it to the paste and the remainder of the milk. The whole pudding should then be mixed up very quickly together, and poured into the hot greased tin and put on the bottom of the oven for three minutes; then place it under the roast meat until cooked.

EIGHTH LESSON.

COOKING—continued.

BAKED STUFFED HADDOCK—SUET PUDDING WITH CURRANTS OR RAISINS AND BAKED POTATOES — DIRECTIONS ABOUT PUDDING CLOTH, BODY WARMERS AND FLESH FORMERS.

THE last dinner we cooked consisted of roast beef and Yorkshire pudding and a cabbage. That dinner cost 1*s.* 2½*d.* We will have a cheaper one to-day; a baked stuffed haddock, suet pudding, and baked potatoes. I bought everything yesterday; I also considered for some time before I went to the market. First, I remembered that it is winter time, and that I must, therefore, have a hot dinner, and take care that the foods I am going to cook shall contain animal and vegetable 'body-warmers,' that will make fat to keep the body warm. We are working people, and my boys want as much food as their father, if not more. A working-man ought to eat more 'body-warmers' than 'flesh-formers,' because he gets hot by working, and the heat he makes in his body will melt a good deal of the fat that covers his bones. It is said that a working-man will burn seven ounces of this fat in a day; if he melts too much he will grow cold, very weak, and thin. The fat he melts passes off through his skin in sweat. Of course he must also have a good quantity of food that will make this flesh, nerves, and muscle.

The dinner I fixed on is a baked haddock, suet pudding,

with currants, and baked potatoes. The children shall each have a large piece of good bread, and then I think they will all have foods that will nourish their flesh, make them fat, and strengthen their bones. I always go to the most respectable shopkeepers and buy the best, because the best contains the most nourishment, and therefore is the cheapest. The best foods are also the cheapest, because they are in season, and therefore very plentiful. There is a proper time of year for every kind of animal and vegetable food—for instance, eggs are very dear in winter, because hens don't lay at that time; they begin to lay in the spring, and then they are very good and plentiful. Oranges are cheap and good in the early spring, but in the autumn they are bad and dear. Fishmongers can sell any fish cheap when it is in season. Salmon is so scarce at Christmas time that people have paid as much as 10*s.* per pound for it, and after all it would not taste as good as it does in the spring, when it is only 1*s.* 6*d.* per pound. Haddocks are now in season, and I therefore bought this large one for 6*d.* The flesh of fish, though it is white, will turn into flesh, nerves, and muscles in the body, just as red meat, beef, and mutton, do. As there is not so much fat in a fish as there is in butcher's meat, I bought suet, which is an animal's fat, and is suitable for those who are working hard. I shall make a stuffing with the suet, as well as use it for the pudding. The sugar in the pudding will turn into fat; children like sugar, but cannot eat much animal fat; children should eat a good deal of sugar at their meals. The bread will feed their flesh and bones and also make fat, because of the starch there is in bread, which turns into fat. We must always have a fresh vegetable to make the blood pure, as I will explain at another lecture.

Now we will begin to prepare the foods which are all ready so that we can see them. As the suet pudding will take the longest time, we will now begin to chop the suet; but first we must take off any bits of skin. You must learn to chop food properly; hold the handle of the knife in your left hand quite steady, and lift the blade with the other in this way. Suet should be very finely chopped; a little flour should be sprinkled over it while it is being chopped to prevent the pieces

from sticking together. If they do the paste will be sad, not light. The currants must be washed. I have arranged that half of you should wash currants, and the other half chop suet; as we have so many cooks the pudding will soon be ready.

Suet Pudding with either Currants or Raisins.—3 oz. of finely chopped suet, ½ lb. of flour, ¼ lb. of clean, dry raisins or currants, 2 oz. of sugar, pinch of salt. All these ingredients are to be mixed together with sufficient cold milk or water to make into a rather stiff paste; tie up in a cloth which has been dipped in hot water and then sprinkled over with flour; boil at least two hours. A plate should be put under the pudding, and the pudding be kept well covered with boiling water.

Directions for pudding cloth on page 44.

Now that our pudding is on the fire we must clean the fish. I have placed, you see, a piece of paper over the table, so that there may be no mess made; we must not only be very clean, but very orderly. I shall notice which of you do your work the best. Fish not thoroughly well washed has been known to make people very ill. When the inside has been taken out, wash the fish well, particularly about the mouth and head, as the mouth may contain some bad food that the fish has been eating; eels and crabs eat anything they find. Give fish at least two waters. In fresh fish the eyes look full and bright; the eyes of stale fish look dull; the gills must be a bright pink, not a dark dull red. I will tell you more about fish when you learn to fry it. Before we prepare any other food we will wash our hands. The stuffing must now be made, just enough to fill the inside of the fish; look well at the space to be filled that we may not make too much stuffing. We chopped enough suet when we made the pudding, so we shall only have to chop the parsley; it should be well washed in cold water. No vegetables should stand in water for more than two or three minutes. Then chop the parsley as you were taught to chop the suet.

Stuffing for Baked Haddock.—2 oz. of suet, 3 oz. of bread crumbs, 1 teaspoonful of chopped parsley, pepper and salt to taste; 1 egg is to be well beaten, to which add about 2 tablespoonfuls of either milk or water, then mix all the in-

gredients together. Fill the haddock with this stuffing and close the opening with a skewer (some people sew it up); bake one hour, baste well with dripping.

Fill the inside of the fish with the stuffing, and put it into the dish, the inside of which must be greased with a little dripping. The haddock will be well cooked in about an hour.

The potatoes we require for baking. A baked potato must never be cooked in a cold oven, as when cooked it should be quite crisp but not burnt. The oven should be so hot that flour will turn brown as it did for bread-baking. The potato skin contains cork, such as you put in bottles to prevent water from coming out. A small piece of cork swells very big in the stomach. You must never eat the potato skin. A baked potato is more digestible than if boiled; it digests in much less time than a boiled one. A roasted potato digests in two hours, a boiled one in three hours and a half. The corky skin keeps in all the juices (like the egg shell), and the juices help the food to digest.

We shall now wash up very quickly, as we can divide the work. First, take the inside of the fish, except the liver, which will feed the cat, the skin off the suet, and the potato peelings, and put them under the grate; cover them over with hot ashes, and brush them quite to the back; after an hour the hot ashes will have taken away any smell, so that when you make up the fire you can throw these things on the back of the fire, when they will burn and feed the fire as coals do. I shall only let you burn what cannot be eaten, or thrown into the swill-tub. People should never keep a swill-tub unless they have a pig, and an outhouse.

Directions for Boiling a Pudding and the best method of washing and drying a Pudding Cloth.

A pudding should always be put into boiling water, and then only allowed to simmer; the water must be some inches above the top of the pudding, lest it should simmer away and leave the pudding uncovered; an old plate chipped at the edges should be kept to place at the bottom of the pan to pre-

vent the pudding from sticking. Directly the cloth is taken off it should be put to soak in water, then well washed in hot water and soda (never soap), well rinsed in clean water, and put out of doors, whether it be wet or dry, as no cloth will be quite sweet unless it has had plenty of fresh air; care must be taken to keep it in a dry place when it is folded up ready to put by. A pudding cloth will stick to the pudding unless, just before it covers the pudding, it is first dipped into boiling water, squeezed dry, and sprinkled over with a little flour. Harding is the best material for a pudding cloth, it costs 5*d.* per yard; a yard will make two good-sized ones.

Notes.—Girls can be chopping small quantities of suet and parsley, as the methods are the same.

As the girls like to buy the food, they should be told the previous week what the dinner of the following week is to be, and then they can bring baskets and their money, &c.

Ingredients Required.

Fish.	Flour.
Suet.	Currants.
Parsley.	Sugar.
Salt.	Potatoes.

Apparatus.

Slate, on which the dinner for the day is written.
No. 5 Sheet, about working-men and 'body-warmers.'
No. 6 Sheet, with 'body-warmers' and 'flesh-warmers.'
Bought and sold for one week; following week the same.

The haddock was divided into three twopennyworths for each girl that wanted to buy, and two potatoes roasted and a little brown sauce. This was sold to three girls; the same girls had each one pennyworth of pudding; what was left of the pudding was sold in pennyworths with a little sugar sprinkled over.

Baked Stuffed Haddock, Currant and Suet Pudding.

Cost.	*s.*	*d.*	Sold.	*s.*	*d.*
Monday	1	2	Monday	0	10
Tuesday	1	1	Tuesday	0.	8
Wednesday	1	0	Wednesday	0	8
Thursday	0	10	Thursday	0	8
Friday	0	10	Friday	0	8
	4	11		3	6

	s.	d.
Money expenses	4	11
Money received	3	6
Balance due	1	5

Questions for Eighth Lesson.

1. Why do men and boys who work hard require a good deal of food that makes fat, called 'body-warmers'?
2. The suet pudding and stuffing contain the following foods—suet, sugar, flour. Tell me which of these foods will make fat, called 'body warmers'? Why will flour make fat, flesh, and bone?
3. How would you clean a pudding cloth, and where would you put it when it was washed?
4. What would you do with the inside of the fish, the skin off the suet and the baked skins of the potatoes?

Receipts for Eighth Lesson.

SUET PUDDING WITH EITHER CURRANTS OR RAISINS.—3 oz. of finely-chopped suet, ½ lb. of flour, ¼ lb. of clean, dry raisins or currants, 2 oz. of sugar, pinch of salt. All these ingredients are to be mixed together with sufficient cold milk or water to make into a rather stiff paste; tie up in a cloth which has been dipped in hot water and then sprinkled over with flour; boil at least two hours. A plate should be put under the pudding and the pudding be kept well covered with boiling water.

STUFFING FOR BAKED HADDOCK.—2 oz. of suet, 3 oz. of bread crumbs, 1 teaspoonful of chopped parsley, pepper and salt to taste. 1 egg is to be well beaten, to which add about 2 tablespoonfuls of either milk or water, then mix all the ingredients together. Fill the haddock with this stuffing and close the opening with a skewer (some people sew it up); bake one hour, baste well with dripping.

NINTH LESSON.

COOKERY—continued.

BOILED TRIPE, ONION SAUCE—PRESERVE TURNOVERS—CLARIFY DRIPPING.

TRIPE is very digestible animal food if it is quite fresh, the coarse fat cut off, and the tripe thoroughly well cooked. I have bought one pound ready dressed, which we will first weigh and then wash. As we wish to keep in all the flavour and

juices, and make the meat look white, we must put it into boiling water, with a cup of skim milk; the milk will make the tripe white, and by boiling five minutes the albumen on the outside will be hardened and the juices kept in; after that time the pan must hang on the recon, where it will be kept simmering until the meat is well done, which will be in about an hour and a quarter. Tripe that has not been dressed requires nearly double that time. When the onions for the sauce are peeled they shall be put into a pan well covered over with boiling water, a little salt added, and allowed to cook slowly for an hour until they are tender. Remember an *old knife* must be kept entirely for peeling onions. A cook is both dirty and careless who uses a knife to cut any kind of food after it has once cut an onion, and who does not wash her hands before she touches any other food.

Onion Sauce.—First boil 3 onions, then chop finely, add 1 pint of boiling milk that has been thickened with a teaspoonful of flour, flavour with pepper and salt, and simmer altogether for five minutes.

Clarifying Dripping.—Pour boiling water into the basin that contains the dripping, and stir the water and dripping up well together, then let it remain until cold. Then take off the cake, and put into a jar just to melt in the oven. When the dripping cake is cold it will be very clean, and keep for some time, as the second melting down, or rendering, as it is called, has sent out all the water. Fat that rises on water in which beef, mutton, or veal has been boiled, should be clarified in the same way.

Savoury Pudding.—3 oz. of bread, 3 oz. of oatmeal, 3 oz. of suet, 1 teaspoonful or 6 leaves of sage, 3 large onions, 1 egg, and 1 gill of milk. Soak the bread in the milk until quite soft, boil the onions in plenty of water; when tender chop them up very fine; the suet also must be chopped very fine; then add them to the soaked bread with the oatmeal. Mix all the ingredients well together. Just before putting the pudding into the oven, add the egg well beaten, pepper and salt to taste. Put an ounce of dripping into the pudding tin, make it hot before you pour the pudding in; bake three-quarters of an hour.

You are now going to learn how to make and bake dripping pastry. Watch all I do, and try and remember all I say, as I intend that each of you shall make a jam turnover at the next lesson. It is much more difficult to make light pastry in hot than in cold weather, because the cook's hot hands and the hot air of the room melt the fat, whether it be dripping, suet, or butter, so that it sticks to the flour and makes a gluey heavy substance instead of a light paste. The cook's hot hands, the rolling pin and paste-board, all get sticky, and are constantly obliged to be sprinkled over with fresh flour; the paste then becomes too stiff. A cook always makes her pastry in a cool room, and if her master is rich will make it on a marble instead of a wooden paste-board. A large clean slate or a tile off a house does as well. The quantities of flour, dripping, and water we shall require must now be measured. To one pound of flour we put four ounces of dripping, and always mix one pound of flour with rather less than a gill of cold water. This basin you remember just holds one pound of flour, this mug one gill, and this tablespoon one ounce. Lest the flour should not be quite dry I put it in a basin on the top of the oven for a short time; if the flour were the least damp the pastry could not be light. This dripping looks very white because it has been nicely clarified, and it will taste as sweet as it looks. Rub the flour and dripping gently together, when this is done make a little hole in the centre, pour the water in gradually, and mix all together with the cool blade of a very clean knife. Before the paste is put on the paste-board just sprinkle a little flour over it, and the rolling pin as well; knead the paste lightly, and do not press heavily on the rolling pin. When the paste is rolled out to the thickness of an inch cut it out into round shapes with a small plate; the jam should then be put on half the round cake, the edges just wetted with a little water, and the other half be turned over the jam, and the edges be pressed together. The lightest and best pastry will be made heavy if the heat of the oven is not exactly right; if too *cold* the paste won't rise up, and if too hot it will be burnt. If there is no thermometer in the oven, sprinkle a pinch of flour on the bottom shelf, as you did in bread-baking: if the flour turns a nice brown in a few

seconds the heat will do; 400° should be the heat by a thermometer. Remember to put the paste on the bottom shelf for five minutes, and then put it on the top one to get brown, as you did with the bread.

We will now clarify this dripping. Clarify is a long word, which means to make clear or clean. Dripping which drops from clean meat which has been washed will not contain dirt, only bits of the outside of the meat or cinders that have fallen into it, because the dripping pan was put too near the fire. Dripping is made clear by pouring boiling water over it in a basin, and by stirring the water and dripping together with a spoon. When the dripping has become quite cold, it forms a hard cake and rises to the top of the water, because dripping is fat, and fat or oil is much lighter than water, and will therefore float on the top of it, just as a piece of wood will float. I have some oil and water in this bottle, and you can see how the oil rests on the top. You might try and mix them together for ever, but they would separate when the bottle had remained still for a short time.

The little bits of dirt or cinder are heavier than the fat or water, and therefore sink to the bottom of the water in the basin. The dripping cake must be put into a jar in the oven until melted, to send out the water in the fat, or it will not keep. Dripping should be kept in a cool place, and it will then be good for some time. Dripping prepared in the way directed is the most nourishing fat next to butter.

The following information is to be given when tripe is not to be got. A small joint of pork should be roasted, and a savoury pudding made. Pork, and all flesh of the pig, requires to be cooked very slowly and well, because sometimes a little creature lives in the flesh called 'Trichina.' The German and Russian people suffer very much from a dreadful complaint because they have the bad custom of eating pork and ham that has not been cooked, only salted, dried and smoked. These creatures are killed by boiling water, or the heat of an oven which is 400°, or by roasting the meat thoroughly and slowly before a fire. We are going to roast a small joint of pork and make a savoury pudding. We will first put the pork, that weighs 2 lbs., very close to the fire for ten

minutes, and then draw it away and let it have half an hour for each pound.

Questions for Ninth Lesson.

1. Why is a pie-crust or any kind of pastry very sad and tough when it is made in a hot room and by a cook who has hot hands?
2. Why is pastry not light when it is made by a cook who presses the rolling pin down heavily on to the paste?
3. How would you find out that the oven was the right heat for baking pastry?
4. When a cook cleans or clarifies dripping she puts it into a basin and pours boiling water over it, and stirs the water and dripping well together. Tell me why the dripping rises to the top of the water, and the dirt falls to the bottom of the basin.

Receipts for Ninth Lesson.

ONION SAUCE.—First boil 3 onions, or about 1 lb., in sufficient water until tender, then chop finely; make a sauce of 1 pint of boiling milk thickened with a tablespoonful of flour, season with pepper and salt; add the onions to the sauce, and simmer altogether for five minutes.

CLARIFYING DRIPPING.—Pour boiling water into the basin that contains the dripping, and stir the water and dripping up well together, then let it remain until cold. Then take off the cake, and put it into a jar just to melt in the oven. When the dripping cake is cold it will be very clean, and keep for some time, as the second melting down, or rendering, as it is called, has sent out all the water. Fat that rises on water in which beef, mutton, or veal has been boiled should be clarified in the same way.

SAVOURY PUDDING.—3 oz. of bread, 3 oz. of oatmeal, 3 oz. of suet, 1 teaspoonful or 6 leaves of sage, 3 large onions, 1 egg, and 1 gill of milk. Soak the bread in the milk until quite soft, boil the onions in plenty of water; when tender chop them up very fine; the suet also must be chopped very fine; then add them to the soaked bread with the oatmeal. Mix all the ingredients well together. Just before putting the pudding into the oven, add the egg well beaten, pepper and salt to taste. Put an ounce of dripping into the pudding tin, make it hot before you pour the pudding in, bake three-quarters of an hour.

TENTH LESSON.

COOKING—continued.

DINNER TO-DAY:—MEAT AND POTATO PIE—CORNISH PASTIES—SCATTERED RICE.

I HAVE often told you that we must eat every day foods called 'body-warmers' and 'flesh-formers' that will make the fat and flesh which cover our bones. Animal foods and vegetable foods contain the same things, but certain things are found in much greater quantities in one than in the other; for instance, all animal foods have water and some minerals, but green vegetables, such as potatoes, cabbages, &c. have a great deal more water and minerals. These bottles contain the quantity of water, minerals, and other substances which there are in a pound of meat. In this row of bottles you will see the quantity of water, minerals, and other substances which there are in a pound of potatoes. Potatoes, you see, have nearly twice the quantity of both water and minerals. Iron, lime, phosphorus, and potassium are minerals. Minerals are hard substances which are dug out of the earth; men and animals cannot eat them; but vegetables grow in the earth, and their little roots suck up water that contains minerals. Harrogate water contains a great deal of iron, sulphur, and other minerals; people go to Harrogate who suffer from scurvy and skin diseases to drink these waters. We boil potatoes with their skins on to keep in the water and all the good things which are mixed up in the water; but, however carefully we cook meat and vegetables, the heat that comes out in steam takes away some of them. We cannot eat any kind of meat, except an egg or an oyster, without cooking; but we can eat some vegetables raw, such as lettuce, water-cresses, radishes, onions, celery, and mustard and cress; fruit of all kinds, oranges, apples, lemons, &c.,—all these contain nearly the same quantity of water and minerals that the potato does, and keep the blood pure. Our sailors, about 100 years ago, used to die of scurvy by thousands when they went long

voyages and had no potatoes or any fresh vegetables or fruit. Now the Government oblige the captains of all vessels to take lemon-juice, that contains a great deal of a mineral food called 'potash,' which sailors take daily; of course potatoes, fresh vegetables, or fruit are much better than lemon juice. You may fancy how terribly sailors suffered by the following account, written by Dr. Guy of London:—

'Round blotches came under the skin, called "purples." The blood ran into the flesh and made the limbs painful and stiff. The blood-vessels were so weak that they broke with a touch. The gums swelled and became dark, the teeth grew loose and fell out of their sockets. The breath was bad, and blood poured from the nostrils and eyes. The poor sufferer became so weak that he fainted at the least exertion, and fell down dead in sight of his native land.'

Dr. Chambers says he considers that the working people of England who live in large towns have bad teeth and breath and pale faces because they eat so little fruit and fresh vegetables. The French people eat nearly twice as much fruit and vegetables as we do, and they manage to get a salad nearly all the year round. Any uncooked vegetables mixed together make what is called a salad. Onions chopped up fine and put on bread and butter are very good. In the winter everyone might get onions, and have a good quantity of pickled cabbage stored up; nothing is better when water-cresses are not to be had. A cold cauliflower, slightly boiled, is good with a salad sauce over it.

Receipt for Salad Sauce.—Put the yoke of a hard-boiled egg in a basin, break it up fine with a wooden spoon, adding a pinch of salt and a pinch of pepper, then keep stirring briskly while you pour in slowly two tablespoonfuls of milk, cream, or sweet oil, then add one tablespoonful of vinegar and half a teaspoonful of mustard; add a little sugar if liked instead of mustard.

The French people cook their vegetables very well, and never let them be hard; they also wash them with great care. The leaves of all vegetables contain more mineral matter than any other part. Vegetables should never be allowed to soak in water; they should be gently and quickly washed in cold

water, the leaves must not be the least crushed. The French people put their vegetables into a wire basket when cleaned, with holes to let out the water, and hang it up, as it has a handle. Stale old vegetables are quite as unwholesome and dangerous to eat as putrid meat, but, unfortunately, they do not smell so badly; a fresh vegetable does not feel soft and flabby. Gardeners can give old vegetables a fresh appearance by sprinkling water over them to make them swell out. People soon get to know the difference between these bad vegetables and fresh ones. There are some places in Oxfordshire where the labourers have a habit of eating lettuce unwashed, and they suffer from the round worm. A little salt kills slugs, &c. Cabbages and cauliflowers should be washed in salt and water, as slugs hide themselves between the leaves and cannot be got out.

The dinner to-day is a potato pie and cold boiled rice; the rice may be eaten with treacle, sugar, or preserved fruit and some cold milk, or with meat or gravy. This is a dinner I could prepare the night before, because I could warm the pies up again. I mean to make some small pies called 'Cornish pasties,' which will contain just what the big one does; these pies will be ready for my son and daughter to take with them to school to-morrow, as they are teachers; I hope they will be able to warm them up somewhere. I bought these scraps of meat last night for 5*d.* per pound. The butcher cut them off the outside of the best joints that had been hanging a few days. Butchers cut scraps off ham, pork, and all their good joints to make them a nice shape; they are quite good and can be bought at 5*d.* per pound. Just dip them in hot water and make them clean; you see the meat is both fat and lean, so that the pie shall contain 'body-warmers,' 'flesh-formers,' and 'mineral foods;' the potatoes and onions will be the mineral food; the crust will have flour and dripping. You learned how to make the pastry we are going to use for these pies at the last lesson.

Receipt for Cornish Pasties.—Rub 2 oz. of clarified dripping into 4 oz. of flour, mix them together with 2½ tablespoonfuls or ¼ of a gill of cold water; knead into a paste, then roll it out until it is the thickness of half

an inch, and line a small plate, tin, or saucer that has been rubbed with a little dripping. Toast a thin slice of either ham or lean bacon *very slightly*, only enough to take away any raw taste, cut it up into pieces of half an inch; next beat up one whole egg in a basin, then add two teaspoonfuls and a half of either skim milk, new milk, or cream to the egg, with a little pepper and salt, and then put in the pieces of bacon; mix all up well together, and fill the saucer with the mixture, and cover it over with a lid of the paste. Potatoes might be used instead of the ham, or mixed with it, or meat might be used of fish, flesh, or fowl.

Preserve or fresh fruit Cornish pasties are very good.

All these little pies will contain the three kinds of food we must eat daily to keep us strong and our skin healthy. The milk and eggs are most nourishing animal flesh-formers, the dripping is an animal body-warmer. The flour is a most nourishing vegetable flesh-former and body-warmer, as it contains starch and albumen. The potato is a mineral food because it has a great deal of potash. In the summer Cornish pasties, filled with fresh fruit, would be very nourishing and good for the blood; the flour in the crust would be a 'flesh-former,' and the dripping put into it a 'body-warmer.' All fresh fruits contain a great quantity of the mineral food, potash.

Receipt for Scattered Rice.—Boil until tender in boiling-water, then pour the water and rice into a sieve, shake the rice about for a short time on the sieve, and stir it with a fork to prevent the rice from sticking together.

Ingredients Required.

Meat.	Flour.	Rice.
Egg.	Dripping.	Salad.
Suet.		

Apparatus.

Food collection, showing component parts of 1 lb. of flour, 1 lb. of meat, and 1 lb. of potatoes.

No. 5 Sheet, with juices and component parts of meat,

Questions for Tenth Lesson.

1. In the winter, when there is no lettuce, mustard and cress, celery, water-cresses, &c., sometimes called 'mineral foods' because they contain minerals such as iron, lime, phosphorus, potassium, what uncooked vegetables could you eat that would do instead of these?
2. Why did an immense number of our poor sailors die of scurvy when they went long voyages about a hundred years ago?
3. Tell me how you could make either a meat, vegetable, or fruit Cornish pasty so that it should contain 'body-warmers,' 'flesh-formers,' and 'mineral' foods.
4. How would you cook rice or macaroni so that it could be eaten with any kind of meat, or with milk and sugar, or with treacle alone?

Receipts for Tenth Lesson.

CORNISH PASTIES, No. 1.—Rub 2 oz. of clarified dripping into 4 oz. of flour, mix them together with 2½ tablespoonfuls of cold water, knead into a paste, then roll it out until it is the thickness of half an inch, and line a small tin plate or saucer that has been rubbed with a little dripping. Toast a thin slice of either ham or lean bacon very slightly, only enough to take away any raw taste; cut it up into pieces of half an inch. Next beat up one whole egg in a basin, then add 2½ tablespoonfuls of either skim milk, new milk, or cream to the egg, with a little pepper and salt, and then put in the pieces of bacon; mix all up well together, and fill the saucer with the mixture and cover it over with a lid of the paste. Potatoes may be used instead of the ham or bacon or mixed with it, or the meat of fish, flesh, or fowl might be used. These pasties can be made the same shape as turnovers if less liquid be used.

CORNISH PASTIES, No. 2.—To 1 lb. of flour, rub in ½ lb. of dripping, any kind will do, then mince a little bacon or ham along with any other kind of meat, and mix with the meat a little potato and onion; season with pepper and salt to taste. Roll out the paste, put in the above, then place on a paste cover, and bake in a slow oven for twenty minutes.

SCATTERED RICE.—2 oz. of rice well washed in cold water, then add 1 quart of water, simmer until tender in boiling water, then pour the rice and water into a sieve; shake the rice about for a short time on the sieve, and stir it with a fork to prevent the rice from sticking together.

ELEVENTH LESSON.

COOKING—continued.

DINNER:—FRIED FISH, PLAICE—MASHED POTATOES—BAKED RICE PUDDING.

EVERY cook ought to know that when burnt fat is eaten, directly it enters the stomach it makes the most unwholesome of all acids called 'butyric acid,' which causes a gas or bad air to form that gives heartburn, pains under the shoulder-blades, and palpitation of the heart. Fat is a very difficult food to cook because it can be made twice as hot as boiling water; water boils when the quicksilver rises up in the thermometer to 212°, but fat does not boil until it rises up to about 600° or 700°. When fat really boils it would burn a piece of fat or meat to ashes in a second, and yet all cookery books will tell you to take great care to make the fat boil in the frying-pan before you put in the fish or any food. The right heat that fat should be for frying any kind of food is 350°. I hope that cooks will soon use the thermometer to find out the proper heat. The best way to find out without a thermometer is to put a piece of bread into the fat; if it becomes nicely browned in rather less than a minute, it will brown the food too. When fish, potatoes, or veal cutlets are put into the fat, let the fat remain at that heat (350°) for about five minutes, until both sides of the fish have become a good brown colour; then either hang the frying-pan on the recon over the fire, or put it on the brig, or oven-top, when the fish can cook gradually in the fat; find out if it is done enough by lifting the flesh with a knife—if it leaves the bone readily it is done. Veal cutlets should cook slowly, as veal is very indigestible unless very well cooked. A frying-pan should be constantly moved about so long as the fat is 350° to prevent the food from sticking to the bottom of the pan, which it will instantly do if the pan is thin. The burnt fat in the pan will, of course, gradually sink into every part of the fish, veal, or potatoes, and make them very indigestible. A mutton chop or beefsteak ought never to be put into a

frying-pan. These two meats contain a great deal more fat than fish or veal; if cooked in a frying-pan the fat covers the outside and gets into the middle and makes the meat very fat and greasy; no wonder that an invalid or a person with a weak digestion is made ill by such dishes. When a chop or beefsteak is put on a gridiron the outside gets hardened, all the juices are kept in, and the burnt fat drops into the fire. A frying-pan should be like ours, a thick iron one, and perfectly clean; if the least speck of either old or burnt fat is left in, the fresh fat will be spoiled.

The fish we are going to fry is a piece of plaice that costs 4*d.* to 6*d.* per pound; it is good because it smells sweet and feels very firm when pressed with my finger. After it has been washed in this cold water it must be well wiped and have a little time to get perfectly dry; unless it is quite dry it will not brown when it is fried. We will put two ounces of dripping into the pan and watch it carefully until it is the right heat; the thermometer is up at 350°, and you see this piece of bread has become a beautiful brown. Just sprinkle a little flour over the fish before you put it into the fat; when the underside is brown we will turn it over; now that both sides are sufficiently browned, the pan shall stand on the brig until the fish is done. Cooks generally beat up a whole egg, dip a brush into the egg and put it all over the fish or veal cutlets, then sprinkle fine bread crumbs over it; the egg and bread crumbs stick together and get brown, if the fish is quite dry and fresh, but not without, though the fat is the right heat.

Baked Rice Pudding.—We will now measure all the quantities we want for our baked rice pudding. Two tablespoonfuls of rice (the same as 2 oz.), 1 pint of either milk or water, or half milk and water, 1 tablespoonful full of finest chopped suet (1 oz.), 1 tablespoonful of brown sugar (1 oz.); the rice must be twice well washed in cold water, and then put into a pie-dish; the milk, sugar, and suet can then be added to the rice, and all be well stirred up together; the pudding ought to be baked very slowly, three hours is not too much; the heat of the oven ought not to be more than 212°.

Nothing is more indigestible for a weak stomach than

eggs which have been put into a pudding and baked, because the albumen in the egg gets very hard and is said to be as difficult to digest as leather. When new milk can be got to put into the pudding, neither suet nor butter need be added; suet is added when water is mixed with the milk.

Mashed Potatoes.—We will now measure what we want to make one dish of mashed potatoes. 1 lb. of mashed potatoes require 1 oz. of dripping, 2 tablespoonfuls of milk (the milk is not necessary). Boil the potatoes in their skins, when done take them out of the pan, let them stand by the fire just to get dry, then peel them, put them back into the pan and beat them well up with a potato-crusher or large fork; the dripping and a little salt can then be added, and when all has been well mixed up together, and become very hot, put the mash into a dish, and just draw the fork lightly across the top to make it look rough.

The dinner to-day will give my family plenty of animal and vegetable body-warmers, flesh-formers, and mineral foods.

Questions for Eleventh Lesson.

1. How would you find out the proper heat of fat to fry either fish, veal, or potatoes, so that they should have a beautiful brown colour? Ought the fat to boil?
2. Why is fried mutton chop or beefsteak very unwholesome and indigestible for an invalid or a person who has a weak stomach? Why ought these two meats to be cooked on a gridiron?
3. Why are eggs indigestible in a baked rice pudding?

Receipts for Eleventh Lesson.

BAKED RICE PUDDING.—2 tablespoonfuls of rice (2 oz.); 1 pint of either milk or water, or half water and half milk; 1 teaspoonful of finest chopped suet; 1 tablespoonful of brown sugar (1 oz.). The rice must be twice well washed in cold water, and then put into a pie-dish; the milk, sugar, and suet can then be added to the rice, and all well stirred up together; the pudding ought to be baked very slowly, three hours is not too much; the heat of the oven ought not to be more than 212°. Nothing is more indigestible for a weak stomach than eggs which have been put into a pudding and baked, because the albumen in the egg gets very hard, and is said to be as difficult to digest as leather. When new milk can be got to put into the pudding, neither suet nor butter need be added; suet is added when water is mixed with the milk,

Full directions are given for frying fish and veal cutlets at page 57.

FRY PLAICE WITHOUT BREAD-CRUMBS AND EGG.—Dip in clean cold water and wipe very dry, and hang up in a current of fresh air if there is time, sprinkle it over with a little flour, put 2 oz. of dripping into the clean frying-pan and melt until a piece of bread turns a nice brown in about a minute, or the thermometer rises to 350°; the fish should then be put in the pan, and turned when the under part looks brown; when the two sides are brown the frying-pan must be put on the hot oven-top, where the fish can cook slowly until the flesh leaves the bone when a knife is put between the flesh and bone.

MASHED POTATOES.—1 lb. of potatoes, ½ oz. of dripping or butter, 2 tablespoonfuls of milk (the milk is not necessary). Boil the potatoes in their skins; when done take them out of the pan, let them stand by the fire just to get dry, then peel them and put them back into the pan; beat them up with a potato-crusher or large fork; the dripping and a little salt can then be added, and when all has been well mixed up together, and become very hot, put the mash into a dish, and just draw the fork lightly across the top to make it look rough.

TWELFTH LESSON.

COOKERY—continued.

FOODS FOR AN INVALID WHO IS NOT ALLOWED TO TAKE SOLID FOOD OR IS SUFFERING FROM A FEVER: MILK—BEEF-TEA—GRUEL—BARLEY WATER.

IF you are nursing patients suffering from the following complaints, called fevers—small-pox, chicken-pox, measles, scarlatina, typhus, enteric or gastric fever, yellow fever, relapsing, remittent, cholera, mumps and influenza, you may give them the following foods: milk, beef tea, &c.

Milk is an animal food, and is the most nourishing of all foods, because it contains every substance that is to be found in animal or vegetable foods.

In these bottles there are exact quantities of the principal substances contained in one pint of new milk. Starch and all those things that make fat are placed together and called 'body-warmers.' Albumen and all that make flesh, nerves, and muscle, are all put together and called 'flesh-formers,' and iron, potash, &c., which are called mineral foods, are all arranged in these small bottles. Mother's milk and cow's

milk are almost exactly the same; though milk contains such a great variety of foods, the most delicate infant can live entirely upon it, because the right proportions of all these different substances have been mixed together with the right quantity of water, and because when the little infant takes it from its mother it is properly cooked by about 100° of heat.

An ignorant cook would boil milk at 212° and spoil the delicate flavour, harden the albumen, and send out some of the substances in the steam. Grown-up people suffering from fever, or who have a delicate stomach, can sometimes drink cold or new milk, when any other food would directly make them sick.

Doctors now consider it is more important to give their patients milk than any other food; they often order a nurse to give a quart and a half in a day to persons who are suffering from any of the following complaints called fevers—small-pox, chicken-pox, measles, scarlatina, typhus, enteric or gastric fever, yellow fever, relapsing, remittent, cholera, mumps, influenza. They also order a nurse to give the strongest beef-tea, which you are going to prepare to-day. Beef is the butcher's meat always chosen to make tea for people who are very weak and have delicate digestions and nerves, because it contains more flavouring matter called osmazome than any other meat. There is very little osmazome in white meat, such as veal, lamb, fish. Mutton has a good deal, but not so much as beef. I will suppose that some one is ill and requires the strongest beef-tea as quickly as possible. The tea must therefore be made of the same weight of beef and water. As I want a pint of tea I bought one pound of the best lean beef. After I have taken off every bit of fat and skin, and cut it up into pieces of about an inch square, I shall let it stand one hour in the pint of water, which must be cold, because I know cold water can draw out all the juices from the meat if it remains in long enough. I also know that I must not let the tea boil at 212° or the flavour is spoiled and the albumen hardened. How can I cook so that I shall be sure it cannot boil (for I am a poor woman, far too busy to watch the pot the whole time it is on the fire or in

the oven)? Fortunately, I know that if I cover the jar of beef-tea and put it into a pan of boiling water, which is either boiling on the fire or in the oven, the beef-tea in the jar cannot boil if it is left there for ever, only cook gently or simmer at about 180°.

The only thing I must do is to take care to keep the water which surrounds the jar boiling, and keep putting in more water, lest the water should all boil away and the pan get burnt, either on the fire or in the oven. Everybody should be taught this scientific fact, that no food can be brought up to boiling point in a pan or jar that is surrounded by boiling water. Double saucepans are sold on purpose for cooking custards, because a custard is spoiled directly it boils. A little pan or jar put into a larger one serves the same purpose. There is in this bottle some beef-tea that I made this morning; it contains the same quantity of meat and water that we have just used. The beef stood for an hour in cold water, and then it was put into a pan of boiling water for one hour. Beef tea ought never to form a jelly when it is cold; this is cold, but quite clear and thin. Here is some beef-tea in another bottle that was made at the same time, with the same quantity of meat and water. The only difference is, that the meat was put into boiling water and boiled for one hour; you see what a small quantity, only a third as much as there is in the other bottle, and the flavour is very poor.

Dr. Chambers says that if sick persons during their illness were given plenty of milk, one quart and a half during the day, and some good beef-tea, they would not die while they are in the fever from starvation, nor after they had lost the fever from weakness, because they had become too thin to recover. During the fever the blood is not only much hotter than it is when we are in health, but it flies much more quickly to every part of the body, and gradually burns up the fat and causes the flesh, nerves and muscles to waste away. Some nurses think that people who have fevers should not have much food, and that strong beef-tea that has been boiled and become a stiff jelly is all the food that ought to be given them. They would not think this if they understood that the beef-tea only feeds the flesh and that the poor patient

is dying because the other parts of the body are being burned up. Milk contains a great deal of mineral food which purifies the poisoned blood, and also feeds the fat.

A nurse should always write down on a piece of paper the exact quantity of food she has given the patient during the day, and mention the exact time when she gave it, so that the doctor can quickly gain a clear account of all that has been done during his absence. The air of a sick room, however well ventilated, will contain a great deal of the breath of the sick person, in which there must be some of the horrid germs that are causing the fever or any disease. If water, milk, or any food is left uncovered, the bad air *must* get into it. Germs grow quickly in milk. Take care always to cover water and everything with a plate or a saucer, and do not keep more food than you want in the room, and do not let anyone in the house eat the food when it is taken out of the room. If the persons are very weak, do not let them sit up in bed to eat the food, but give it them in a little covered cup like this, which can be put into the mouth without letting the food run over the bed-clothes; wash it and every utensil directly it has been used in a little boiling water. Every sick-room ought to have a little kettle. Be sure never to give the medicine out of the *feeding-cup*. A nurse should think the day before how much beef-tea and milk she will require. If a pint or gill, she will require the same weight of beef. The beef ought to be cut up and put into the cold water, so that the juices will all come out during the night, and be ready to cook in the morning.

We will now learn how to make barley water. Two ounces of pearl barley is enough to make one quart of barley water as a drink to quench thirst, for which only is it given, as it is not a nourishing food. The two ounces should be washed in cold water, then they should be boiled for five minutes in another water, which, like the first, must be thrown away. Two quarts of boiling water must then be added, and the barley allowed to boil until the water is reduced to only one quart; cut some very thin slices off the outside of a lemon to flavour the barley water, squeeze out some juice through either a piece of muslin or a sieve to prevent the pips from

falling in, and add sugar to taste. The barley water ought not to be strained unless the sick person particularly wishes this to be done.

Milk Gruel.—As gruel is much more nourishing made with milk, I will give the receipt used in the Children's Hospital. Grits are the best. Grits, ½ oz.; water, ¾ oz.; milk, ½ pint sugar, ½ oz.

Water Gruel.—Mix 1 large tablespoonful of oatmeal into a smooth paste with a little cold water, pour in (mixing all the time) a pint of boiling water, boil for ten minutes, stirring as before, and strain. It may be eaten with salt or sugar, according to taste.

Questions for Twelfth Lesson.

1. Why do doctors order a nurse to give new milk and beef-tea to a person who is suffering from a fever, or any of the following complaints, which are all called fevers—small-pox, chicken-pox, measles, scarlatina, typhus, enteric or gastric fever, yellow fever, relapsing, remittent, cholera, mumps, and influenza?
2. Why would a person in a fever be starved or pined if the nurse only gave him beef-tea?
3. The strongest beef-tea is made with the same weight of water and beef. How would you make a pint of beef-tea so that none of its juices and flavouring matter called osmazome should be wasted?
4. By what means could you cook food in a saucepan or jar and prevent the food from ever boiling at 212 degrees?

Receipts for Twelfth Lesson.

Beef Tea, the Strongest.—1 lb. of lean beef, remove all skin and gristle, cut up to the size of an inch, cover over in jar with 1 pint of *cold* water and a pinch of salt; let it stand for one hour, then put the jar into a pan of boiling water, either on the fire or in the oven, for one or two hours; the water in the pan must be kept boiling. If an egg is ordered to be added to the beef-tea, it must be beaten up and added when the tea is taken off the fire; if put in and allowed to boil, the egg would crack.

Barley Water.—2 oz. of pearl barley to be well washed in cold water, then boiled for five minutes in another water; this water must be thrown away; 2 quarts of boiling water must then be added, and the barley allowed to simmer until the water is reduced to 1 quart; cut some very thin slices off the outside of a lemon to flavour the barley water, squeeze out some of the juice through either a sieve or a piece of muslin; add sugar to taste. The barley water ought not to be strained unless the sick person particularly wishes this to be done.

MILK GRUEL.—½ oz. of grits, ¼ pint of water, ¾ pint of milk (the milk and water together makes a pint), ½ oz. of sugar.

WATER GRUEL.—Mix 1 large tablespoonful of oatmeal into a smooth paste, with a little cold water. Pour in (mixing all the time) a pint of boiling water, boil for ten minutes, stirring as before, and strain. It may be eaten with salt or sugar, according to taste.

THIRTEENTH LESSON.

COOKERY—continued.

FOODS TO BE COOKED: WHOLE BEEF-TEA—POTATO SURPRISE—FRESH MUTTON MINCE—AN EGG WHIPPED AND MIXED WITH MILK OR WINE—BOILED BATTER PUDDING WITHOUT AN EGG—BOILED CUSTARD.

WE are going to-day to cook a few dishes for sick persons who are recovering from a fever, or who have delicate digestions and have been ordered by the doctor to take some of the solid foods that are named on the slate:—'Whole beef-tea,' 'potato surprise,' an egg whipped and then mixed with either milk or wine and a boiled custard. We will first make three gills or one and a half pints of whole beef-tea, for which we shall only require half the weight of fresh-killed meat. The strongest beef-tea, such as you made at the last lesson, had, you remember, one pound of beef to one pound of water, that is, equal weights of both water and beef. I shall remove all fat and skin and cut the beef up into pieces of about an inch square, as we did in making the strongest beef-tea, but I shall not put the meat to stand in the three gills of cold water, only in one gill, which will be a third of it. When all the juices of the beef have been drawn out into the gill of water, the beef must be put into a jar or saucepan with the remaining pint of water. When it has simmered for two hours it must all be poured into the cold raw juice; the pieces of beef are again to be taken out and either chopped up very fine or pounded in a mortar or wooden bowl with the end of a rolling-pin or

potato-crusher, and added to the hot beef-tea. A wholesome flavouring for beef-tea is a piece of green celery stalk, or a small onion, and a few cloves may also be put into it. A little Worcester Sauce is a safe flavouring. The beef for this tea ought to stand in the cold water all night, and be made in the morning. When beef or any food has been cooked it loses its flavour or osmazome, because as the meat is cooking the steam carries it off. Invalids who have weak digestion must not eat cold meat, or much worse still, cold meat warmed up. However carefully a cook may warm or hash up cold meat, the heat she is obliged to use will draw out all the flavouring matter and juices that may have been left in the meat. Cold meat you know has not the flavour it has when hot and fresh-cooked.

I am now going to teach you how to make a little dish called a 'potato surprise.' We must first choose a very good and large potato and wash it well, cut a hole, but take care not to destroy the skin, as it must be left on to cover the hole up when we have scooped out the inside and filled it with fresh, juicy, lean, uncooked mutton that has been minced up fine, with a little pepper and salt. When the potato is baked, a little fresh gravy can be poured in if there is any, and the meat appears dry. I have bought a fine lean mutton chop. The fat must be cut off before I chop or mince the meat. The bone shall be put into a small pan with two tablespoonfuls of water to stew, ready to be made into a little gravy to pour into the potato when it is cooked. The chop might be minced, and gravy made from the bone and sent up on a dish with little pieces of toasted bread put round in the gravy, instead of putting it into the potato.

Doctors always ask whether eggs agree with their patients before they order them to eat them, as some people cannot digest eggs in any form, even when they are in good health. It is a pity when this is the case, as an egg is a most nourishing food. A great deal depends upon the way an egg is cooked. Dr. Chambers has drawn up the following list to show the best way of cooking an egg for an invalid or a person who has a weak stomach.

Digestibility of Eggs.[1]

	Time to Digest. Hours.
Eggs whipped and mixed with milk or wine	1½
Eggs, fresh raw	2
„ Soft-boiled	3
„ Hard-boiled	3¼
„ Fried	3½

We shall find by studying this list that an egg, like beef, milk, and all other foods, is most nourishing and digests in the shortest time when the albumen has not been hardened and the flavour and juices have not been carried off by too much heat. Heat cooks our food by making it tender, and by separating it so that the teeth can chop it up, and the saliva in the mouth can completely mix with it. After an egg has been beaten up or whipped, it is not a raw egg, because it has been cooked by the heat made in beating it, and the beating has separated every part so that the saliva can mix with it. If I had a very delicate thermometer I could show you how many degrees of heat had been made by the force used in beating the egg, because the quicksilver would rise several degrees when it was put into the beaten egg. As you were taught at a previous lesson how to beat an egg properly, I will beat this egg and mix it with two tablespoonfuls of new milk and half a teaspoonful of sugar, just to show you how to prepare an egg in the most digestible way, according to Dr. Chambers's egg list. Wine can be used instead of the milk when ordered.

You see that a perfectly raw egg digests more quickly than a soft-boiled one, because none of the juices have been taken away, nor the albumen hardened. A hard-boiled egg and a fried one are equally indigestible, and take the same long time to digest—three hours and a half!

I taught you how to cook an egg so that it should never boil, at the third lesson. Baked puddings with eggs are very indigestible, because the whole of the egg becomes very much hardened by being baked for so long a time. I will now

[1] Dr. Chambers's *Diet in Health and Disease.*

make a small batter pudding without eggs. I shall require three teaspoonfuls of flour, one pint of new milk, one pinch of salt, and flavour it with ginger and nutmeg. A custard can be eaten with this pudding or a little wine used as sauce. A custard if properly made is a very nourishing and digestible dish, because neither the egg nor the milk are allowed to boil. We will make a custard in this little white preserve jar, and put it into this large saucepan, so that it cannot come up to boiling point. Though the custard in the jar cannot boil, it would be spoiled if we do not watch *very carefully* and take the jar out of the boiling water *directly* we feel by stirring that the custard is growing thick. Directly a custard becomes lumpy it is spoiled, because it shows that the egg has separated from the milk. Quantities: the yolks of two eggs, one gill of milk, one teaspoonful of sugar, and a bay-leaf.

A potato surprise, batter pudding, and custard would be a nice little dinner to send up to an invalid. I shall arrange the tray for carrying it as prettily as possible, with a little flower or a few green leaves placed in a little pot of some kind to stand in the centre.

Apparatus.

No. 9 Sheet, Digestibility of Eggs.

Questions for Thirteenth Lesson.

1. Why ought invalids or delicate people not to eat cold meat, or cold meat that has been warmed up or hashed?
2. Why is an egg that has been beaten or whipped a cooked egg?
3. Why is a whipped egg very easily digested?
4. How would you arrange a little tray upon which you were going to carry a dinner to an invalid?

Receipts for Thirteenth Lesson.

Whole Beef Tea.—¾ of a pound of lean beef. Remove all skin and gristle, and cut up into pieces an inch square, place in a basin with 1 gill of cold water, and let them stand for about 1 hour, until the cold water has drawn out all the juices. The pieces of beef should then be taken out of this water and put into a jar with 1 pint of cold water, and the jar be put into a pan of boiling water for 2 hours, when the cold gill of juice in which the beef stood must be poured into the hot beef-tea, the pieces of beef taken out and pounded well in a mortar, or if there is no mortar,

in a clean wooden bowl, with the end of a rolling-pin or potato-crusher; then add them to the hot beef-tea, flavour with a little salt, and a stalk of green celery or a small onion and a few cloves.

CUSTARD.—Yolks of 2 fresh eggs beaten up well and mixed with 1 gill of new milk, 1 teaspoonful of sugar, and 1 bay leaf. Put all into a jar, which should stand in a saucepan of boiling water. Stir the custard the whole time. Directly it begins to thicken, take the jar out of the boiling water and keep stirring for five minutes.

AN EGG BEATEN UP WITH MILK OR WINE.—First beat up a whole fresh egg, and then add either 2 tablespoonfuls of new milk, or sherry wine if ordered. Some people may like a little sugar.

MINCED MUTTON.—Take a fresh mutton chop or any fresh lean mutton. Remove all fat and flesh from bone, chop the lean very finely, flavour to taste with pepper and salt. Cook the mince in a little jar covered over for half an hour in a pan of boiling water, let the bone with 2 tablespoonfuls of water be simmering to make a little gravy to add to the mince. When served up, little pieces of toasted bread can be put round the dish in the gravy.

POTATO SURPRISE, taken from Dr. Chambers's book on 'Diet in Health and Disease.'—Choose a large potato, brush and wash quite clean, scoop out the inside, taking care to leave a piece of skin on to cover the hole. Take a fine mutton chop, cut off all the meat, mince the lean very fine, and flavour with pepper and salt; then fill the potato with the mince, cover up the hole and bake the potato. If the mince is dry, a little gravy can be added.

BOILED BATTER WITHOUT EGG.—Three tablespoonfuls of flour, 1 pint of new milk, 1 pinch of salt; flavour with ginger and nutmeg.

BOILED BATTER PUDDING WITH EGGS.—Whisk 2 eggs to a froth, then add 3 tablespoonfuls of flour and 2 tablespoonfuls of milk. Beat the batter until it is perfectly smooth; then add 1 pint of milk and a pinch of salt. Boil in a buttered basin or floured cloth one hour.

DRY TOAST.—Cut a slice of bread, *at least* half-an-inch thick, off a loaf of very light bread that is neither quite new nor stale. Toast it very quickly before a hot, bright fire, then cut off the crust, divide it if the slice is large, and place the pieces upright. If they lie flat the toast becomes tough and indigestible, because the moisture cannot get out through the toasted part—only through the soft sides. Toast should be eaten directly it is made or it is not good. Thin hard toast contains very little nourishment, and like a hard biscuit is indigestible. When bread is toasted slowly before a poor fire it always becomes hard and flinty, though the slices are not cut thin.

FOURTEENTH LESSON.

COOKERY—continued.

MEAT STOCK—VEGETABLE SOUP MADE OF MEAT STOCK—SOUP WITHOUT BUTCHER'S MEAT—BAKED ROLL TREACLE PUDDING.

BEFORE we begin to cook I wish you again to examine the contents of these five bottles, which hold all the principal substances to be found in beef or butcher's meat. If I were to boil beef or any butcher's meat for a very long time I could boil away all the good substances except one, which is the toughest and least digestible, called 'gelatine,'—here it is in this bottle. The gelatine we buy in packets to make jelly or to stiffen any dish like blanc-mange is the same substance. Some meats contain more gelatine than others. There is a great deal of gelatine in bone; the gelatine in this packet is made from bone. Gelatine is nourishing when mixed up with different substances, as we find it in meat; but it is not nourishing when eaten by itself, and only takes away the appetite; for this reason do not give delicate patients jelly which is almost entirely made of gelatine. I shall try and show you how a great deal of the best food is wasted and made very indigestible because cooks do not understand what kind of a substance gelatine really is.

The first food to be prepared to-day is called stock. Meat-stock is only the water in which meat has been boiled. As this water must contain some of the flavouring matter, juices, &c., that have come out of the meat, and also some fat that is melted during the cooking, a good cook never throws this water away, but pours it *directly*, while it is hot, into a clean pan. When it is cold she takes off the fat that rises to the top and uses it for making cakes, &c., after clarifying it according to the following directions:—Put the fat, when cold, into a jar in the oven until melted, then pour it off into a clean jar. The top part will be clean, the water and bits having fallen to the bottom. The cook uses the water in which the meat was cooked as a stock of food ready to make into gravy,

or into soup, by adding vegetables, &c. Soups are much more nourishing when made with vegetables; the vegetables ought to be well done, and, if possible, cooked separately, and then put into the meat-stock. If the meat-stock and the vegetables are cooked together some of the stock is wasted, because it simmers away while the vegetables are cooking. I prepared some stock yesterday. The stock in this glass jar was made with a pound of meat and three pints of water. I put the stock when made into a glass jar that you might see how *clear* the jelly is, and that a pint of good stock has been made. This stock is *clear* because I washed the meat and bones quite clean in hot water, and put them into a perfectly clean saucepan, with *cold water* of course, as the juices have to be brought out into the soup. This stock is very nourishing, because the meat was never allowed to boil. If soup boils the albumen in the meat becomes hardened and rises in little white bits to the top and makes what is called scum. Even if the soup does not boil a scum will rise if the meat and saucepan are not spotlessly clean, for any bits of food that were sticking to the sides and bottom of the pan come off, stick to the albumen, and rise with it to the top.

I will now show you some stock made with exactly the same quantity of meat and bone, cooked according to a receipt given by a professed cook, which was that the meat was to BOIL (212°) for two hours. During some of the time the saucepan lid was to be removed, in order that the scum might be taken off to make the stock clear. At the end of the two hours which I had spent by the hot fire in watching the pot and in skimming the top to remove the albumen, I found I had only made this little piece of gelatine that just covers the palm of my hand, instead of all this clear, nourishing stock, which fills this glass jar. An ignorant cook would tell you that this *stiff stock* is very strong and nourishing, but a doctor would tell you that if a man, woman, child, or dog, were to be fed on nothing else for some time, they would first suffer from diarrhœa and then die of starvation. I should recommend all cooks who wish to make their stock, soups, or any dish very stiff, to buy some gelatine sold in packets and add it to the stock, or any food they wish to make stiff, instead

of ruining the meat and wasting their time in trying to send away all the other good substances it contains up the chimney in order to make a small quantity of gelatine that can be bought cheap in packets. Everyone, and cooks particularly, ought to read the following directions given this year about soup-making, and the proper meat that should be used for cooking, as it shows how much the poor suffer in public institutions owing to the ignorance of cooks. When bones are used to make soup they ought to be cooked for some time alone, and then be added to the meat, as the gelatine in the bone requires a long time to dissolve, and greater heat.

'*Meat.*—As a general rule, beef is the most economical form of animal food, when its price is considered in relation to the nourishment which it affords. It is richer in osmazome than mutton, and the fact that, as a general rule, it is more satisfying to the stomach, is one which should not be overlooked. Mutton is, on the whole, more digestible than beef, and is better adapted to the requirements of invalids. We therefore recommend beef for healthy prisoners at labour, and mutton for the sick in hospital.

'It appears to be overlooked at some of the prisons that good soup and good cooked meat cannot be prepared by the same process.

'When the object of "boiling" meat is not to make soup but to retain the utmost amount of nutriment in the meat itself, large pieces of it should be plunged for a few minutes into boiling water, so as quickly to produce a *cortex* of hardened animal fibre, and it should then be cooked as slowly as possible at a temperature never exceeding 160° or 165° Fahrenheit. If the temperature be much lower than 160° the albuminoid substances do not coagulate, and the meat is not cooked. When the temperature is kept above 170° the muscular tissue shrinks, and the meat is rendered hard and indigestible.

'As the quantity of meat issued to a prisoner should not be more than is absolutely necessary, it is of the highest importance that it should be turned to the best account, and that the "ounces" in the diet table should be actually represented by properly cooked and digestible meat in the dinner tin.

'A prevalent fault in prison kitchens is, that excessive heat is used and the meat converted into a condensed shrunken mass of little or no nutritive value. We think it right to express ourselves strongly on this subject, on account of its great importance, and we must point out that it is useless to provide good meat unless such care be taken in cooking as to retain its nutritive properties in the highest possible degree.[1]

'But whatever care may be taken in cooking meat, a portion of its juices and salts will escape into the broth, and we recommend that this be served up with the meat to which it belongs. When the meat is served up on one day and the broth on another, as is sometimes done, the organism is deprived for a time of a portion of those principles which it is the object of the meat ration to supply. The "salts" of the meat are as essential to nutriment as its nitrogen or carbon.'[2]

The two soups we are going to make to-day shall contain all the three foods we must eat daily to be strong—viz., 'body-warmers,' 'flesh-formers,' and 'mineral foods.' One soup will be made of meat-stock and vegetables, and the other will be made with vegetables and no butcher's meat. We will now wash the vegetables and cut them up; the quantities of vegetables to be added to the meat-stock will be six ounces. The vegetables we shall use will be carrots, turnips, onions, and celery. The stock I have prepared was made of two pounds of meat and bone (shin of beef or brisket), and four pints of water, simmered for four hours. The vegetable soup will be made as follows:—Two pints of water, two ounces of green peas (carrots or any vegetable will do), one onion, one lettuce. All the vegetables must be cut up fine. If carrots are used they should be scraped (carrot soup is the nicest of all vegetable soups). To this must be added two cold potatoes, or uncooked ones, one tablespoonful of flour or oatmeal, mixed up with two ounces of dripping, half a teaspoonful of sugar, some salt and pepper, half a pint of milk; the milk to

[1] The thermometer will be found useful in showing the cooks that the temperature is often much higher than they suppose.

[2] Taken from a copy of the Report of the Committee appointed to inquire into the Dietaries in Prisons in England and Wales, 1878. (Signed) Sir Selwyn Ibbotson.

be added when the vegetables are done.[1] Milk is not necessary for the soup, only it makes it more nourishing. These must all simmer gently for nearly an hour, and then the soup will be quite ready to be eaten. Split or dried peas require a much longer time—about two hours—and this is the most nourishing soup of all.

As there are so many cooks we shall soon prepare the vegetables. Remember when you clean the carrot you must scrape very little off, as the most nutritious part lies under the thin skin. The turnip has a very thick skin, so you must take off about one eighth of an inch, or the thickness of two pennies. The first meat-soup is the famous pot-au-feu that the French make. They put the meat and vegetables all on together very early in the morning into a strong stewpan with a good lid, and let the soup cook slowly for four hours, so that it is ready when they come home to their dinners. They put it on a stove, not on a fire, so that it can be safely left, as it never boils as our pans do. The French, Germans, and Russians, rich and poor, have some kind of soup every day.

To-day we are going to make a baked treacle roly poly. We say treacle, but of course we use golden syrup, which is treacle that has been made clean and clear. It is often more convenient to bake or steam rather than boil a pudding, because these puddings do not require a cloth. At our next lesson we will steam a fruit pudding and make a baked rhubarb or apple pudding.

The great secret of making a good baked pudding is to have fresh juicy fruit, put plenty of sugar in, and let the pudding be well baked for about two hours in an oven the right heat, such as pastry requires. If properly done the pudding should turn out of the basin or mould very brown, and covered with a thick, rich juice. A baked fruit pudding should never be sent to table dry and a light colour. The crust is often made too thick, and baked too quickly.

Receipt for Preserve or Treacle Roly Poly.—Mix 3 oz. of finely chopped suet with half a pound of dry flour, about two tablespoonfuls of cold water, and a pinch of salt; roll out to

[1] Dr. Chambers's *Diet in Health and Disease.*

the thickness of about half an inch. A tablespoonful of fine bread-crumbs to be mixed with as much treacle as will thickly cover the paste. If the treacle is spread alone over the paste, being thin or liquid, it runs out; a few bread-crumbs make the treacle thick enough to spread about a quarter of an inch deep over the paste. Wet the edge of the paste with cold water, roll it up, and press the edges firmly together; lay it in a dripping tin, and bake slowly for about one hour and a half. Some people prefer the crust to be made of dripping.

Receipt for Baked Fruit Pudding.—Suet crust made exactly like the above, and rolled out to the same thickness. Rub a basin inside with either dripping or butter, sprinkle with sugar, and then line with paste, and fill it to the top with either rhubarb or apples, cut to the size of an inch. Add two tablespoonfuls of sugar, cover over with a crust wetted round the edge with cold water, and press it to the lining. Bake for about two hours in a moderate oven. A boiled or steamed pudding is made in exactly the same way. In the case of the steamed pudding, care must be taken to keep the water under the steamer constantly boiling, and, of course, the water must boil before the pudding is put into the steamer, In making either a boiled or steamed pudding, the cook must remember not to put any sugar in the bottom of the basin, as is done in a baked pudding. A baked pudding, like a loaf of bread, should first be put on the bottom part of the oven, and then lifted on to the top shelf to brown.

Apparatus and Articles Required.

Component parts of beef.
Glass jar with clear stock.
Stock prepared so that only the gelatine is left.
Stock enough for the meat soup.
Packet of gelatine.

Questions for Fourteenth Lesson.

1. Why ought the water or stock in which any fresh butcher's meat or vegetables have been boiled (except potatoes in their skins) never to be thrown away, but poured while it is hot into a clean jug or basin?
2. What is the white substance called scum, and why does it rise to the top of the water in which butcher's meat or vegetables are boiled?

3. Why do doctors seldom allow a nurse to give jelly to patients, who are very weak or have delicate stomachs?
4. Tell me how you would make a soup with meat so that it should contain 'body-warmers,' 'flesh-formers,' and 'mineral foods;' also a soup that should contain these three things without any meat?

Receipts for Fourteenth Lesson.

MEAT SOUP.—Stock made of 2 lbs. of fresh meat and bone; shin of beef is suitable, or brisket, and 4 pints of water, simmered 4 hours; 6 oz. in all of the following vegetables—carrots, turnips, onions, and celery.

VEGETABLE SOUP.—Two pints of water, 2 oz. of green peas (carrots or any vegetables will do), 1 onion, 1 lettuce. All these vegetables must be cut up fine; if carrots are used, they should be scraped (carrot soup is the nicest of all vegetable soups). To this must be added 2 cold potatoes, or uncooked ones, 1 tablespoonful of flour or oatmeal, mixed up with 2 oz. of dripping, half a teaspoonful of sugar, some salt and pepper, half a pint of milk. The milk to be added when the vegetables are done. Milk is not necessary for the soup, only it makes it more nourishing. These must all simmer gently for nearly an hour, and then the soup will be quite ready to be eaten. Split or dried peas require a much longer time (about 2 hours), and this is the most nourishing soup of all.

Full directions about making stock on page 69.

PRESERVE OR TREACLE ROLY POLY.—Mix 3 oz. of finely-chopped suet with half a pound of dry flour, about 2 tablespoonfuls of cold water, and a pinch of salt. Roll out to the thickness of about half an inch. A tablespoonful of fine bread-crumbs to be mixed with as much treacle as will thickly cover the paste. If the treacle is spread alone over the paste, being thin or liquid, it runs out; a few bread-crumbs make the treacle thick enough to spread about a quarter of an inch deep over the paste. Wet the edge of the paste with cold water, roll it up, and press the edges firmly together; lay it in a dripping tin and bake slowly for about one hour and a half. Some people prefer the crust to be made of dripping.

BAKED FRUIT PUDDING.—Suet crust made exactly like the above, and rolled out to the same thickness. Rub a basin inside with either dripping or butter, sprinkle with sugar, and then line with paste, and fill it to the top with either rhubarb or apples cut to the size of an inch. Add two tablespoonfuls of sugar, cover over with a crust wetted round the edge with cold water, and press it to the lining. Bake for about two hours in a moderate oven. A boiled or steamed pudding is made in exactly the same way. In the case of the steamed pudding, care must be taken to keep the water under the steamer constantly boiling, and, of course, the water must boil before the pudding is put into the steamer. In making either a boiled or steamed pudding the cook must remember not to put any sugar in the bottom of the basin, as is done in a baked pudding. A baked pudding, like a loaf of bread, should first be put on the bottom part of the oven, and then lifted on to the top shelf to brown.

FIFTEENTH LESSON.

COOKERY—continued.

PEA SOUP—ON BOILING—BOILED RABBIT AND ONION SAUCE, OR BOILED MEAT OR BACON—HASTY PUDDING AND TREACLE—CLEAN AND TRUSS A FOWL.

PEAS are a most nourishing food because they contain a great many substances that form flesh. As they do not contain many substances that contain fat, called 'body-warmers,' they ought to be cooked with some fat meat, either pork or bacon. The stock we are going to make our pea soup of to-day is the water some bacon was boiled in yesterday. When peas and fat are cooked together they make an excellent hot dinner for people who are working hard out of doors in winter time. Split peas are the best kind; they should be soaked overnight in cold water. The bad peas will float on the top of the water like bad eggs, and should be removed. It is better to cook the peas by themselves until they are tender, and then add the peas and the water they have been boiled in to the stock and the other vegetables, and simmer together for two hours. The peas and bacon can, of course, be cooked together for three or four hours if there is no time to soak the peas overnight. The soup to-day will be made of the following ingredients:—Two quarts of stock, one quart of split peas, one head of celery, four onions, two carrots, and two turnips; all to be chopped fine. As our peas have soaked overnight the soup will be ready when it has simmered for one and a half or two hours.

You are now going to learn how to boil any kind of animal food so that all its juices shall be kept in and not brought out into the water. To-day we are going to boil a rabbit, that you may know how to clean one, and how to tell an old one from a young one. A young rabbit has smooth sharp claws; if the rabbit is unskinned and has not been opened, you must cut it open and take out all that is inside, then skin it in the following way:—

Rabbits, dressed or undressed, should always be dipped in

hot water before they are cooked. When skinned, wash the rabbit well in cold water and let it soak for a quarter of an hour in warm water to draw out the blood. Then bring the head round to the side of the body and fasten it there by means of a skewer run through the head and into the body. The rabbit must then be put into a pan and quite covered over with *boiling* water, and let it simmer until tender, which will be in about an hour, or three quarters of an hour. When put on the dish to send to table, it ought to be quite covered over with onion sauce. The boiling water into which the rabbit was put will harden the outside and keep in all the juices.

A fowl with black legs is not so white when boiled as one with white ones. In order to find out whether the fowl is young, press the breast-bone of a fowl just at the end where the opening is made to clean out the inside. If this part is very soft like gristle, and not hard like bone, you may be sure that the fowl is a young one.

First pluck off the feathers and pull out all the hard pointed quills called pens, which are very numerous in young fowls. Then singe off the long hairs with a piece of lighted paper; take out the inside. Great care must be taken not to break the gall bladder, which is very bitter, and if broken would cause the fowl to have a bitter taste and be spoiled. Wash the fowl well in cold water; cut off the neck, leaving skin enough to skewer back; cut the feet off to the first joint, tuck the stumps into a slit made on each side of the belly, twist the wings over the back of the fowl, and fasten the top of the leg and the bottom of the wing together by running a skewer through the wings and the body. This is called 'trussing a fowl.' I should always dip a fowl, ready dressed, in warm water before either roasting or boiling it, as poultry, like butcher's meat, is handled by dirty hands and put on dirty places, though some cooks will tell you that a fowl ought not to be washed at all.

Questions for Fifteenth Lesson.

1. Why is pea soup a good dish for cold weather?
2. How would you skin and clean a rabbit?
3. How would you prepare a fowl for cooking that had not been cleaned, nor had its feathers plucked?

Receipts for Fifteenth Lesson.

PEA SOUP.—Two quarts of stock from boiled bacon, or any stock with a little bacon, 1 lb. or pint of split peas, 1 head of celery, 4 onions, 2 carrots, and 2 turnips. All to be chopped fine and simmered. If the peas have soaked overnight, an hour and a half or two hours are sufficient. Pepper and salt to taste, and when served, add a little dried mint.

HASTY PUDDING.—Boil 1 pint of milk; a pinch of salt. Sprinkle gradually into the milk about 4 tablespoonfuls of flour, beating the mixture all the time with a fork while it is simmering, until it is rather thicker than batter. Then let it simmer for five minutes.

SIXTEENTH LESSON.

COOKERY—continued.

SHEEP'S HEAD—SUET DUMPLINGS—PICKLED CABBAGE AND ONIONS—DRIED HERBS, PARSLEY, MINT, MARJORAM, SAGE, THYME.

THE sheep's head has been washed thoroughly as you can see; it has also soaked for two hours in warm water, so as to get rid of the blood. It must be put into this saucepan and completely covered over with cold water. Directly it boils we will put in these vegetables when they have been cut up: three carrots, three turnips, three onions, sprig of parsley, a teaspoonful of salt, a teaspoonful of pepper. Mix two tablespoonfuls of Scotch oatmeal smoothly with a little stock out of the pan, and then gradually stir it into the pan and keep stirring until the broth boils. The pan should then be taken off the fire and placed where it can only simmer for one and a half or two hours. Care must be taken to fasten the lid of the saucepan down tight.

Suet dumplings are excellent cooked in the sheep's head broth. I have brought all the things ready mixed so that we shall only have to make the paste into dumplings and put them into the broth as quickly as possible, as they will take as long as the broth to cook. The dumplings are made of the

following quantities: 1 lb. of flour, 6 oz. of suet, very finely chopped, a pinch of salt, and a gill of either milk or water. A suet pudding made like this is very good boiled in a long roly-poly shape, and when done cut into slices and put into the dripping pan for a minute or two, and then browned before the fire; children like this very much with roast meat or gravy. At our next lesson we will prepare the sheep's head and everything we have cooked to-day for the broth, for you to see how to make it yourselves.

While the broth is cooking I will show you how to pickle red or white cabbages, for they are the same in every way except in colour. We will take off the outside leaves of this fresh cabbage, cut it into four quarters, take away the stalk, and then cut the quarters into shreds very fine, lay them on this dish, and cover with plenty of salt. Some people let the cabbage lie in the salt for twenty-four hours, but I think two or three hours are plenty, as the salt draws out all the juices and spoils the colour. I shall let it stand in the salt until I have boiled half-a-pint of vinegar and 1 oz. of black pepper, and a little sugar. I shall then squeeze the cabbage quite dry to get ont the salt, put it into a jar, and pour the vinegar over it when it is cold.

This cabbage can be eaten the next day, or it will keep, if the jar is covered over, for several weeks.

Pickled Onions.—1 lb. of small pickling onions, 1 pint of vinegar, ½ oz. of pepper, a little ginger. Take care the onions are quite ripe; the stalks are then dry and fall off. Ripe onions when pickled will keep for a year, but unripe ones not for more than a short time. Peel the onions and wash in cold salt and water, in which they must stand for one hour. Half the quantity of vinegar is to simmer for half an hour with the pepper and ginger, then to be poured through a sieve, and added to the cold vinegar, and poured over the onions. Cover up the jar, and do not use for three months.

It is now the time of year for storing up dried herbs such as thyme, marjoram, sage, parsley, and mint, for winter use. I have taken care that the herbs are quite fresh and ripe, just rinsed in a little cold water. When all the leaves have been stripped off the stems they must be put on separate

pieces of white paper in the oven, or on the top of the oven, and left there until all the leaves have become crisp and dry, so that they can be rubbed through a sieve. Should there be no sieve the leaves may be rubbed between the hands into a fine powder, if the hands are very clean and quite dry. The bottles are labelled ready to receive four kinds of herbs. If the bottles are corked their contents will keep for a year. Some people have an untidy habit of keeping dried herbs wrapped up in paper.

At the end of this lesson I shall give you some questions which I am sure you will be able to answer, as you have been learning during the last year the use of the different kitchen utensils that are mentioned in the questions. I will now tell you how you can keep bread so that the crust shall not become soft. After the bread has been baked and become quite cold, it ought to be kept in an earthenware pan that stands in a dry cool place, covered with a lid that has holes in it; a wooden lid is best, because china ones so easily break. If the earthenware pan is not glazed, air will pass through the pan. Flour is a food that is eaten by germs that are always floating in the air and ready to fall into any food they like, particularly if the food is a little damp. If flour were kept in a damp cupboard it would soon become very damp and full of mites and living germs. We must therefore take great care that the jar that holds the flour shall stand in a dry place and shall keep out the air and the little living germs in the air. The jar should be covered with glaze outside, because the glaze prevents the air from getting in, and the lid should have no holes. An earthenware jar prevents the flour from sinking into any holes or corners, as it does into the corners of a wooden box or a tin box. A jar can also be easily washed out once a week, and above all be easily made *perfectly dry*. If the bread is kept in a wooden box, when it is washed the water runs into the corners and into the wood, and takes a very long time to get perfectly dry. I am glad that we have found during our lessons that the cheapest utensils are the best and sweetest.

Questions for Sixteenth Lesson.

1. Tell me how many of the following cooking utensils a working man's wife ought to have. The price of each utensil is given. How much money would it take to buy all you think she would want?

	Price each.	
	s.	*d.*
Iron saucepans from 1*s.*9*d.* to	3	0
Thick iron frying-pan	1	6
Thick gridiron	3	0
Iron kettle	4	6
Bottle-jack	10	6
Dripping-pan	1	3
Yorkshire pudding tin	0	8
Wooden spoons	0	2
Iron spoons	0	3
Knife-box	2	0
Colander (tin)	1	6
Dredging-box	1	0
Wooden bowl	2	4
Rolling-pin	0	4
Paste-board	1	2
Pepper-box	0	4
Hand brush	0	6
Scrubbing brush	0	6
Soap box	0	6
Black-lead brush	0	8
Earthenware bread-pan, with wooden lid with holes	1	6
Earthenware pan for flour, glazed, with wooden lid without holes	1	4
Brown jars for holding sugar, rice, and all groceries	0	4
Steamer	2	0

2. What kind of saucepans do you think are the safest, strongest, and most easily kept sweet and clean?
3. What is the best material for making the kitchen cloths and dusters that are required in a cottage home? How many would a yard make? What number would be wanted for a week's use and a change, and how much would they all cost?
4. Why is an earthenware pan the best to keep bread so that the crust shall not become soft? Why should the lid (made of wood) always be kept on, and have some holes in it? A pan like this is also the best for keeping cheese.
5. Why is an earthenware jar that is glazed inside, and has a tight-fitting lid *without holes*, the best for keeping flour?

Receipts for Sixteenth Lesson.

Pickled Onions.—1 lb. of small pickling onions, 1 pint of vinegar, ½ oz. of pepper, a little ginger. Take care the onions are quite ripe; the stalks are then dry and fall off. Ripe onions when pickled will keep for a year, but not if unripe for more than a short time. Peel the onions and wash in cold salt and water, in which they must stand for one hour. Half the quantity of vinegar is to simmer for half an hour with the pepper and

ginger, then to be poured through a sieve and added to the cold vinegar and poured over the onions. Cover up the jar, and do not use for three months.

SHEEP'S HEAD BROTH.—The sheep's head to be washed thoroughly, and to soak for 2 hours in warm water to get rid of the blood, then put into a saucepan and completely cover with cold water. Directly it boils put in the following vegetables, when they have been cut up: 3 carrots, 3 turnips, 3 onions, sprig of parsley, a teaspoonful of salt, a teaspoonful of pepper. Mix 2 tablespoonfuls of Scotch oatmeal smoothly with a little stock out of the pan, then gradually stir it into the pan, and keep stirring until the broth boils. The pan should then be taken off the fire and put where it can only simmer for one and a half or two hours. Care must be taken to fasten the lid of the saucepan down tight.

SUET DUMPLINGS.—1 lb. of flour, 6 oz. of suet, very finely chopped, a pinch of salt, and a gill of either milk or water. Dumpling to be boiled in the sheep's head broth.

SEVENTEENTH LESSON.

COOKERY—continued.

MACCARONI WITH CHEESE—A MOULD OF SEMOLINA—COCOA—COFFEE—PORRIDGE.

BEFORE we cook the maccaroni we will again look at the principal substances contained in a pound of flour. Gluten and all the flesh-formers are, you see, placed together. Gluten is the same substance as albumen. Maccaroni is made chiefly of gluten that has been taken out of wheaten flour, and is a very nourishing flesh-former. It is very easily cooked, and not expensive, because a small quantity swells very much with cooking. Two ounces make a good-sized dish. The best kind is sold in *straight* sticks, and is eightpence per pound. We will break these two ounces of long sticks into pieces of about four inches, and put them into this saucepan of boiling water, with a little salt, where they will have plenty of room to swell. Place the pan where the maccaroni can simmer, and cook gently. When it is quite tender I shall take it out, spread it on a flat dish, add a little pepp

and salt, scrape two ounces of new Cheshire cheese all over the top, and put it in front of the fire to brown. This dish is very nourishing, as cheese is also a flesh-former.

Semolina is roughly-ground wheat of a hard kind that contains a great deal of gluten and is very nutritious, because besides gluten it has all the other good things which wheat possesses. I shall put one tablespoonful into half a pint of milk, sweeten with two tablespoonfuls of sugar, and let it simmer very gently on the top of the oven for half an hour. It must be well stirred for the first ten minutes. As soon as it is ready I shall pour it into this basin that has been well rinsed out with cold water. When the semolina is cold it will turn out, and be very nice eaten with treacle, sugar, or preserve. Semolina is also very good eaten hot. In the summer time cold moulds made in the same way of whole or ground rice are very nice.

Revalenta arabica is ground lentils, and is very nutritious.

I have brought the substances contained in one pound of tea and one pound of cocoa to show you, so that you may see how much more nourishment there is in cocoa than there is in tea. Coffee contains the same substances as tea, except caffeine, which is the flavouring matter of coffee. Cocoa contains two body-warmers—cocoa-butter and some starch, also some flesh-formers—gluten, &c.

Theobromine is the flavouring matter that soothes people's nerves, just as the theine and caffeine do in tea and coffee. Like all flavouring matter it is very delicate, and is spoiled if boiled; for this reason we never allow tea, coffee, or cocoa to be put on the fire; only pour boiling water over them. The best cocoa is Epps's cocoa nibs, and should be made in the following way.

Cocoa.—Nibs are 1*s.* 4*d.* per lb. (this cocoa is of course quite genuine). 1 oz. of nibs to 3 pints of water; stew gently in a jar in the oven 1½ hours, or on the top of the oven to simmer for 3 or 4 hours. It is very good taken with half the quantity of boiling milk, or less if preferred; sweeten to taste. Some people will put the jar of cocoa in the oven all night to be ready for breakfast. When cocoa is made from

the packet which is ground cocoa a teaspoonful is put into the cup and boiling water is poured on to it and well stirred. Milk is added to taste.

You all know how to make a cup of tea, but not many English people can make a good cup of coffee. I will teach you how to make it as it is made in France, Germany, and Russia, where rich and poor take it instead of tea for their breakfast. They never put it on the fire to boil any more than tea, but have a coffee-pot like this, which has a little strainer in the middle upon which the coffee rests. The boiling water that is poured into it passes over the coffee and falls into the bottom part. You can take off the top part where the coffee dregs are, and put the lid over the under pan and send it to table.

The very best coffee is spoiled and disagreeable if it is not very hot. The first thing will be to take care that the coffee pot is made very hot by pouring boiling water into it. When it has been poured out I shall put in two tablespoonfuls of coffee, and then take care to pour boiling water over the coffee and place the pot, while the water is running through, on the top of the oven, or where it can be kept very hot. The milk must also be very hot, though not boiling. The French half fill the cup with milk and then pour in the coffee. This with sugar is a very nourishing drink. This coffee-pot cost 2*s*., and can be bought at any respectable tinman's shop.

This is your last lesson of the course, which has lasted a year. During these lessons I have endeavoured to teach you that even strong people who have done growing cannot be healthy unless they eat three kinds of food daily—viz., 'body-warmers,' 'flesh-formers,' and 'mineral foods'—and that these different foods will not nourish every part of the body unless they are cooked so that all the substances they contain are kept in and the food is made tender. If food is cooked with too little heat the food is tough and indigestible, and if too much heat be used the food is also made tough and the osmazome or flavouring matter is carried away, which is the substance that tempts an invalid or a delicate person to eat, and gives him the power to digest the food he has been

tempted to eat. All kinds of food are best eaten fresh, because the air, or the oxygen gas in the air, soon gets into them and spoils their flavour and changes their nature.

All foods, as you have seen by examining the contents of milk, flour, eggs, beef, potatoes, coffee, tea, and cocoa, contain some water—just the quantity of course that is required to mix all the different substances together. You will find that the foods that change or go bad the most quickly are those that have the greatest quantity of water. For instance, milk, butcher's meat, fresh vegetables and fruit, very soon go bad, and contain an immense quantity of water. Wheat, oats, tea, coffee, or cocoa have very little water—only from 1 oz. to 1½ oz. in a pound. When some foods are preserved the water is sent out in steam by great heat, and the flavouring matter and some of the juices must go out with the steam. Butcher's meat is made to keep by rubbing salt over it, which draws out the water and juices. Salt beef, ham, bacon, &c., will keep for a long time, because the water, juices, &c., run out into the salt brine, which is thrown away. Very salt meat is a dear food, because when it is eaten it does not make good pure blood that can feed and strengthen every part of the body. Salt meat should always be eaten with a good quantity of potatoes, or any fresh vegetables or fruit, all of which contain the mineral foods that have been drawn out by the salt. Our sailors still suffer from scurvy on long voyages, because they are obliged to eat salt meat without potatoes or any fresh vegetables or fruit. It is not the salt that gives the scurvy: it is the meat without its juices and minerals which causes this terrible disease.

Milk is preserved in tins by using great heat, that drives out the steam or water. A great quantity of white sugar is put into the Swiss milk, which makes it thick and prevents it from going bad. A mother's milk contains some sugar, but it is quite a different kind of sugar from that we make. The sugar that is manufactured sometimes ferments in the stomach and turns sour, but the sugar in a mother's milk does not. Children who are fed on this preserved milk will sometimes grow very fat, because the sugar turns into fat in the body. Children grow fat that are fed on the following foods, which

contain nothing but starch, and starch, like sugar, is changed into fat:—

Oswego.
Maizena.
Corn-flour.
Arrowroot.
Cassava meal.
Potato-starch.
Sago.
Sago meal.
Salep.
Tacca starch or Otaheite arrowroot.
Tapioca.
Tapioca meal or Brazilian Arrowroot.
Tous-le-mois (West Indian).

Though the infant or child looks fat, and the nurse is very proud of its great size and very much astonished that such a fine child cannot walk when it gets to be a year old, directly the doctor sees the poor fat baby he knows it has been starved or pined by being fed on only one kind of food, that could not make bone, muscle, flesh, or nerves, only fat. He then tells the mother that her child has a complaint called 'rickets,' which may make it a cripple for life, or leave it with poor, weak, crooked legs. If people who have done growing cannot be strong and healthy unless they eat daily 'body-warmers,' 'flesh-formers,' and mineral foods, how is it possible for a growing infant to be strong unless it has all these foods to feed its fat and flesh and make its bones strong? Until a child is seven years old its bones are not quite hard. New milk has every substance to be found in animal and vegetable foods. If mother's milk cannot be got, the baby should have daily three pints of new cow's milk until it has cut some teeth. Though flour and bread is such a nourishing food for children, an infant would suffer agonies of pain and be soon pined to death if fed on it, because the saliva in its mouth cannot digest the starch in the flour and turn it into sugar. When it begins to cut its teeth the saliva becomes quite different, just like the saliva which grown-up people have. Children ought to have nothing but milk until they are nine months old.

Dr. Ferguson, who examines and weighs factory children every week to see if they are strong enough to go to work, says that he finds that young people between the ages of thirteen and sixteen who are fed on milk for breakfast and

supper, grow twice as fast as those fed on tea and coffee. I am very glad to think that children are now not allowed to go to work until a medical man considers they are fit to labour.

Oatmeal porridge is excellent food for breakfast if it is properly made, but it is generally too little cooked, burnt, and lompy. Coarsely-ground Scotch oatmeal is the best. I will now show you how to make it. I shall mix two tablespoonfuls of oatmeal with a teacupful of cold water until it is quite smooth in this basin; then pour in a pint of boiling water, and keep frequently stirring. The pan should either be put on the hob or hung on the recon for nearly three-quarters of an hour. A great many people cook oatmeal in a double pan, or by putting the pan with oatmeal into a larger one filled with boiling water.

Apparatus, &c., Required.

Component parts of flour.
„ „ of milk.
„ „ of tea.
„ „ of cocoa.
„ „ of 1 lb. of potatoes, to show the great quantity of water in fresh vegetables.

Receipts for Seventeenth Lesson.

Maccaroni and Cheese.—2 oz. of maccaroni. The straight sticks must be broken into small pieces of about four inches, or to suit the saucepan. Boil in water until tender; then place in a dish, a little salt and pepper added, and some cheese grated over the top; then put into a hot oven until it is nicely browned.

Mould of Semolina.—1 tablespoonful of semolina; ½ pint of milk; sweeten with 2 teaspoonfuls of sugar. Stir for ten minutes, and then simmer for 1 hour or more. Pour it into a basin that has been well rinsed with cold water. (Full directions given at p. 83.)

Cocoa.—Nibs are 1*s.* 4*d.* per lb. (this cocoa is of course quite genuine). 1 oz. of nibs to 3 pints of water. Stew gently in a jar in the oven 1½ hours, or on the top of the oven to simmer for 3 or 4 hours. It is very good taken with half the quantity of boiling milk, or less if preferred; sweeten to taste. Some people will put the jar of cocoa in the oven all night to be ready for breakfast. When cocoa is made from the packet, which is ground cocoa,

a teaspoonful is put into the cup, and boiling water is poured on to it and well stirred. Milk is added to taste.

PORRIDGE.—Mix 2 tablespoonfuls of coarsely ground Scotch oatmeal with a teacupful of cold water until it is quite smooth, and then pour in a pint of boiling water, and keep frequently stirring it in the pan, which must be either on the hob or hung on the recon, or put into a jar in boiling water, where it can simmer without fear of burning for three-quarters of an hour. Some prefer to use a double saucepan for making porridge, as it must be well and slowly done, or it is not wholesome.

EIGHTEENTH LESSON.

LECTURE ON DIET, WARMTH, AND CLOTHING.

WHENEVER we hear of wonderful cases in which people have been able to live without solid food for ten days like the poor Welsh miners, or for a year like the Welsh 'fasting-girl' in 1868, we shall find that the people who had to undergo this privation had three things, namely, water, warmth, and quiet; that is to say, they had no work to do and no exercise. In the case of the Welsh 'fasting-girl,' she always remained in bed; directly the doctors who were sent down to watch the case saw that she really had no solid food or water she gradually sank, and died at the end of about a week. When the fat in the body is reduced to a certain quantity death occurs; for instance, if a man weighs 100 pounds, he will die when he weighs only 60 pounds. The fat pig that was buried for 160 days under three feet of chalk came out very thin but alive; he had taken the water which had trickled down the rocks, the close little room kept him warm.

Invalids who have become very thin after a severe illness often owe their lives to being kept very quiet. A knowledge of the facts I have mentioned has proved very valuable to persons who have been shut up in times of siege; they knew that their lives depended upon warm clothing and quiet.

Doctors know directly when a person is dying of starva-

tion. Sad cases sometimes occur because people do not know certain signs which are unmistakeable. Starving people become very thin; their faces grow very pale and livid; their lips white, because the red corpuscles in the blood grow daily fewer; their eyes have a dreadful expression, look bright, stare, and never seem to wink; the limbs move very slowly, the voice is feeble, they stagger like drunken men. It is in this stage of starvation policemen sometimes mistake the poor sufferer for a drunkard, and carry him off to the lock-up. The little blood they have flies to the brain; that organ, sad to say, works night and day, because in starvation the power of sleep dies away. They picture the most delicious foods, and fancy they are eating them; after a time the desire for food goes, the juices that digest the food disappear, digestion becomes more and more difficult, until at last the appetite goes altogether and the breathing is very slow. Dr. Chambers gives this terrible description of starvation, and says that some of these signs may be seen by watching a half-starved London needlewoman as she enters her poor home.

There was a very fine picture in the Royal Academy in 1874, called the 'Casual Ward;' a man asking to be taken in at a workhouse. Dr. Chambers says that the wonderful effect which that picture had upon all who saw it arose from the fact that the artist who painted it knew perfectly all the signs of starvation. The same authority says that want of food injures and weakens the brain as well as the body, and that whenever famine appears crime and brutality immediately break out.

Erasmus Wilson, the distinguished 'skin doctor,' speaks very strongly, in his book on the skin, about the necessity of good food for young people. The diet of children cannot, he says, be too varied. Change of food to the stomach is what change of air is to the general health. This he considers so rational a view that he wonders how anyone can hold a different opinion; yet, he declares, 'I have met with parents who come to me and boast that their children are fed exclusively on mutton.' Another mania is to give them only a certain quantity, not allowing the children to satisfy their hunger. On one occasion he was consulted for eruptions of the scalp,

and, after putting certain questions, he found, as he expected, that the eruptions were caused by starvation. Directly these children had plenty of food and a proper variety of it, their heads recovered. Dr. Chambers says that a deficient diet would also cause the following symptoms:—a glazed appearance in the eyes, an ulcer in the cornea, and finally blindness. When these symptoms are met with in reformatories, orphan asylums, and all other public institutions, they ought, he says, to be closely watched, for people are apt to think these cases must be treated by lowering the quantity of food, whereas that treatment soon takes away all chance of recovery. I have frequently been told myself, by rich and poor mothers, that it was strange that their children had these breakings-out, as they had given them several doses of opening medicine.

Doctors often find that they can restore the insane by giving them good food. Brain diseases, it is said, cause 81 per cent. of all deaths in London before the age of ten; 92 per cent. before the age of fifteen. I cannot understand how children can grow up strong, either morally, mentally, or bodily, who go to schools where they are not only frightened by the brutality of bigger boys or girls, but are underfed, overworked, and breathe bad air at an age when they are least able to bear these hardships.

The following are two dietaries drawn up by Dr. Chambers and Dr. Smith for children in the nursery, and for boys and girls at school:—

Diet for School Boys and Girls.

There should be four meals daily.

BREAKFAST.—Porridge, treacle, new milk half-a-pint.

Girls the same, or café au lait (coffee with half-a-pint of new milk), butter and bread without limit.

DINNER.—Joints of meat, always hot and always fresh; salt meat never oftener than once a week, and so lightly salted that the liquor can be used for broth at the same meal. Meat unlimited. A variety of fresh vegetables: always pota-

toes; split peas; French beans and rice boiled in meat liquor. Pudding daily after meat: rice and other farinaceous puddings made of milk; after them come suet puddings, boiled or baked, made also of milk; and roly-poly preserve puddings and similar puddings made with suet. On days when soup is given, the pudding might be supplied by bread and cheese.

TEA.—Half-a-pint of warm or cold new milk; bread and butter in unlimited quantity. Tea for girls if required; large quantity of milk.

SUPPER.—Bread and cheese, if bread and milk have been given for tea.

Children's Diet in Nursery.

Children should have four meals a day, but meat only at one, or at most two; the latter when a small portion is allowed. When in health they should have no wine or beer, no coffee, strong tea, or other exciting drinks. Once cooked succulent meat, without sauces or condiments, eggs, plenty of farinaceous pudding, mealy potatoes, carrots, spinach, French beans, rice, bread, fresh butter, porridge, roast apples, and oranges should form the staple of the nursery commissariat.

A great many parents and guardians hold as ignorant ideas about clothing their children as they do about feeding them; clothing is of as much importance to young children as their food. Every part of an infant should be covered up but its head. If a baby's head is kept hot it will dream and be feverish and restless; it is not intended that its brains should work. For that reason great care ought to be taken to keep its head cool. A baby has generally no hair on its head when it is born, and the effect of this is to keep it cool. Nurses won't believe this. They will cover the head both by day and when it is in bed, in spite of all the doctors say. Every other part of its body ought to be kept very warm, or the blood will not be able to pass through the capillaries to feed the flesh. What is the use of feeding a child with good food if the food, when it is made into blood, cannot get out of the

capillaries to feed the body? Cold shuts up these wonderful little blood-vessels; therefore a child will starve unless its limbs are covered up.

The heat of the blood of grown-up people is about 100°, but for the first four months of an infant's life its heat is only 95°. Doctors have found that when young puppies or kittens are allowed to remain in their proper place by their mother's side their heat is only one degree lower, but if removed their heat soon sinks to the temperature of the air. You must know that we die when the heat of our blood is only 70°. I believe that many a young infant's life is lost by being put during the winter or cold weather into a smart bassinette. A baby's life really depends upon its being *kept* warm, as it has very little power of making its own heat; and yet our babies in England, a civilised country, are doomed to wear a dress that would chill the blood of a strong man or woman; a cotton frock, made like a ball dress with short sleeves and cut low so as to expose its delicate little chest. And this is the style in which a poor little girl is got up for six or seven years of her life. Boys are better off, because mothers put them into jackets and trousers at a very early age, because they like to see them look manly. A sensible young mother, a friend of mine, determined to get a dress for her infant that should leave no part uncovered. She found, to her surprise, when she applied to friends who lived in London, Paris, and Germany, that they could not furnish her with such an unusual garment; fortunately an American lady she knew in Leeds possessed one, and I have brought the curiosity to show you. I am rejoiced to think that in one country at least children are properly clothed. In spite of all doctors can say, old nurses persuade mothers that a baby can bear more cold than a strong man or woman, and that it is good to harden them. These very children, who are to be hardened as they call it, are generally those who spend most of their time in hot nurseries.

One cold winter's day at Scarborough I followed two nurses who had the care of a little girl of about six, dressed in a velvet hat and feathers, white fur jacket, black velvet frock that only came to her knees. As the child was crying

I spoke to the nurses, and told them it was no wonder the poor little girl was cold with her legs uncovered on such a day. They both smiled at my want of knowledge, and said that the only way to make her strong was to leave her legs bare. A very stout mother wrapped up in fur once told me that she always let her little children go bare-legged so that the oxygen could enter the skin.

Directly old or young feel cold, you may be sure the blood is not circulating properly and feeding all the organs. When the blood does not reach the outer skin chilblains come. Chilblains are only diseased flesh which may break and leave a sore. Cold has the effect of stupifying the brain. The blood when we are cold circulates so slowly that very little reaches the brain, and still you will find that schoolrooms where children are obliged to sit still for hours and use their brains to learn their lessons, are often very cold. No sitting-room ought to be colder than 55° or 60°.

Perfect clothing ought to be light and warm. The great amount of heavy clothes that some women wear is said to cause serious complaints. Clothes have no warmth in themselves; we wear them in order to prevent the heat that is in our bodies from escaping. The great point then is to choose materials that are light, warm, and keep in the heat. It would be well if mothers would study and see how beautifully the bodies of animals are protected; their bodies are covered with either fur, feathers, or wool. All these are made of animal substances, as they are a part of an animal. Everyone should know that animal substances are non-conductors, that is, will allow very little heat to pass through them. I have brought you an eider duck, which is considered to have the lightest and warmest covering. It comes from the Shetland Isles, where the cold is very great during the winter; though this bird is so large, and weighs about four pounds, it can fly eighty or ninety miles an hour. Let us examine its covering. The most delicate part, you see, the chest, is covered with something beautifully white and soft; it is down; and though so light and soft, down has a greater power, some say, of preventing heat from leaving the body than any other substance. You can see what an immense number of feathers this bird

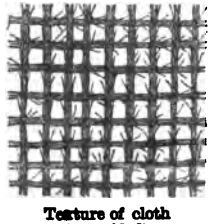
has; each feather contains a little air, and there is also an immense quantity of air between each row of feathers.

You will perhaps be surprised to hear that very little heat can pass through air, as it is a non-conductor. In Russia, where the winters are very severe, houses are built with double windows, so that there shall be a space between them which, of course, is filled with air. This wall of air prevents the heat that is in the room from going out. Perhaps you have noticed a poor little canary, that has been left all night in a cold room, how large its feathers have become during the night, they spread out so that its head becomes nearly buried in them. By spreading out the feathers in this way room was made for more air to get in between them and the feathers, and the air prevented the heat from escaping.

We could not very well use feathers to cover us as clothes, but we can wear animal textures, such as fur, or cloth and flannel, which are made from wool.

Here is some wool that has come from a sheep's back. It looks and feels very light, because it contains a great deal of air. When this wool is woven into flannel or cloth there will be a great many little spaces between each thread, such as you see in this magnified piece of cloth. All these spaces will be filled with air, so that the cloth and the air ill protect us from the cold.

FIG. 3.

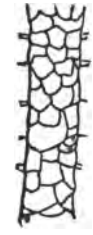


Texture of cloth (magnified).

People should be very careful to air woollen clothes that have been hung up in damp rooms or passages; the air that is contained in the clothes will be damp and give them cold. Woollen clothes are light and warm like feathers, and allow the perspiration to pass through them, which makes them very healthy. Loose clothes are much warmer than tight clothes, as you well know if you have ever worn a pair of tight boots, for your feet, if it is cold weather, will always be cold in them. A man's dress is much warmer than a woman's, not only because his clothes are woollen but because they are made so much looser, so that a great deal of air can remain between them. A man who wears a flannel shirt, a cloth

waistcoat, and cloth coat has three walls of air to protect his body. No wonder women can bear so much less cold than men when we think that very often they are clothed entirely in cotton or linen, and that these cold materials are bound close to their bodies by tight stays, which prevents the blood from circulating. If you could see a thread or fibre of wool you would find it has scales; these scales give wool a rough feeling. Wool also feels very warm to the touch, because it sucks up the heat from your hand instead of letting it pass through it. If you cannot tell by the touch whether a material is made of wool or cotton, you should unravel a bit of the material and you will soon see how hairy it is if it is made of wool. The hair of all animals is scaly, like wool. Government inspectors expect girls to know the difference between woollen, cotton, and linen materials.

FIG. 4.



A fibre of wool, magnified 310 times. It presents on its surface the ordinary scaly character of hair.

All clothes which are made from vegetable structures, such as linen and cotton, are very cold, because they *do* allow the hot air to pass through them, but hold a great deal of water or perspiration, as they are porous. They are also more closely woven together and therefore allow very little air to collect in the spaces between the threads. When you get into bed don't you find the sheets very cold? The linen or cotton that the sheets are made of lets the heat of your body pass through into the blankets; but if you get into the blankets you soon find yourself very warm because the wool and the air in the blankets prevent your heat from escaping.

FIG. 5.

A fibre of linen, magnified 155 times.

FIG. 6.

A fibre of cotton, magnified 155 times.

Here is a drawing of a cotton and a linen thread. The linen thread is round and smooth, the cotton is flat and

twisted and has sharp edges. Linen, therefore, feels and is a much softer material than cotton, and for that reason is used to cover wounds.

You must examine the drawing of a linen thread (fig 5.), and compare it with the cotton one (fig. 6). The cotton material does not feel so smooth, but I think you will say that cotton feels warmer than linen. You are right; the cotton feels warmer to the touch, because it does not let the heat from your hand pass away too quickly, and it also does not hold as much water or perspiration. However much you perspire in a flannel-shirt it never sticks like a cold plaster to your skin, as a linen one does after violent perspiration. Doctors say flannel should be worn both summer and winter, so that when we perspire the skin may not be chilled. Furnace men and all persons who work in warm rooms ought to be covered with flannel. Linen cannot be worn, Erasmus Wilson says, in hot climates, because the perspiration it holds soon gets very cold and chills the body very quickly.

I must say a few words about clothing that is made of fur, leather, and feathers. Nothing can be warmer than a fur cloak. It also has the same property as wool in allowing the perspiration &c., to pass away. The only place where fur is not a safe clothing is when worn round the throat, as it keeps that part so warm that it becomes very tender and the fur-covering cannot be done without. You will find that people cease to suffer from sore-throats when they merely wear a silk tie, which is sufficiently warm, silk being an animal texture. The reason it feels so smooth is because the fibres are round. Silk comes next in warmth to cotton; it does not hold so much moisture. Professor Tyndall says that the hairs of a hare are the most perfect non-conductors. Down covers are delightfully warm and light, and healthy too, as they do not retain the perspiration. You must remember what I said about the eider duck.

Mackintosh is a very dangerous clothing, as no perspiration can pass through it. I have a bag here which is made of it. You see it can hold water as perfectly as if it were a jug.

This piece of felt is made of hair and wool, and has a

wonderful power of keeping anything hot or cold that it covers. I will tell you more about this curious material another time. All materials that are made of animal structure require to be kept very clean, because germs of disease can live for a long time in them, as they feed on the material; for instance, moths multiply rapidly in fur and cloth. The human hair also requires to be kept clean for the same reason. Unfortunately people have an idea that a flannel shirt can be worn longer than a linen one, but this is a great mistake. The hair of our heads is very nearly the same substance as wool, feathers, and fur. Some people have such tender skins that they cannot bear flannel, or even silk shirts, to touch them. In these cases, which are rare, linen must be worn next the skin and the silk or woollen over that.

FIG. 7.

A human hair (magnified).

You will perhaps wonder, after what I have said about air having the power to prevent heat from escaping through it, why it is necessary we should wear clothes at all. You must remember the air that surrounds our bodies is made up of little particles of matter; these warm particles are constantly being carried off by the wind, and cold ones come to fill their places.

NINETEENTH LESSON.

LECTURE ON BREWERS' YEAST, GERMAN YEAST, PLANTS CALLED FUNGI, AND FERMENTATION.

THIS tumbler is filled with the brewers' yeast which your mothers use in making bread. It only looks, as you can see, like a brown froth or foam. For hundreds of years learned men did all they could with their naked eyes to find out what this wonderful yeast could be which kept constantly working and growing more instead of less. With all their looking they could discover nothing more than you can see, until magnifying glasses were invented about 200 years ago. Then

a Dutchman called Leeuwenhoek took one of these glasses, examined a small quantity of yeast, and to his great astonishment discovered that it consisted of thousands of little bags or cells called torulæ. It was no wonder that the learned men who had no magnifying glasses could not see these little bags, as they are so small that 3,000 of them will only cover a square inch. Soon after this discovery a Frenchman—Cagniard de la Tour—made some more experiments, and found that each of these little bags was a plant which grew very, very quickly, one out of another, when put into sugar and water, just as soap-bubbles come one out of another in a chain when blown through a tobacco-pipe. If you look at the illustration on page 23, you can see a single yeast plant, and also a chain of them fastened together. The Frenchman Cagniard de la Tour next found out that these little plants not only grew very quickly in sugar and water, but that they changed the sugar and water into two new substances—carbonic acid gas and the spirit called alcohol, which makes people tipsy when they take beer, wine, brandy, or any drinks called fermented drinks. You all know, of course, that every plant is a living creature, and therefore cannot live unless it has air to breathe called oxygen gas, as well as food to eat. Helmholtz, another scientific man, determined he would discover how the little yeast plant managed to get oxygen gas when it was buried in sugar and water. After watching for a long time he found the wonderful little creature had the power of separating the sugar, which is made of three things—carbon, a hard substance, and two gases, hydrogen and oxygen. The yeast plant breathed as much of the oxygen as it required, and all that was left of the oxygen joined again directly with the carbon and hydrogen gas and made two new substances—alcohol and carbonic acid gas—because there was not enough of the three things—oxygen, hydrogen, and carbon—left to form into sugar again.

I will now tell you how the spirit, or alcohol and carbonic acid gas, which is in beer is made. The brewer first makes a juice called sweet wort by mashing up malt and hops together in a boiler. When this juice is just lukewarm it is poured into a big, open tub called a vat, and a small quantity of

brewers' yeast is poured in. The yeast grows very quickly—first, because it finds plenty of sugar to feed on that comes out of the malt; and secondly, because the sweet wort was luke-warm, which is just the heat in which the plant can work best. Great heat, 150°, kills it. Cold does not kill, only stupefies and shrivels it up so that it cannot work. You must remember these facts.

The yeast is very light, and therefore floats and covers the top of the vat. As it rises the brewer skims it off and sells it to any one who wants any. After a certain time the sugar is all eaten up, so that the yeast plant gives up working, or fermenting as it is called. The sweet wort has then been changed into beer, which contains a great deal of carbonic acid gas and spirit. The beer after a short time is poured into barrels and corked up. The white foam that rises to the top of a glass of beer is not yeast, but little bubbles of air filled with carbonic acid gas. It is this gas that makes ginger-beer, lemonade, champagne, &c., taste sharp, and forces the corks out of the bottles. Carbonic acid gas is often made by mixing soda and tartaric acid together in water. I will now make some of this gas in this way, and you will see how the water in this tumbler will be filled with air bubbles of carbonic acid gas, which will rise up and fall over the sides of the tumbler.

Bakers who make bread without yeast mix soda and tartaric acid in some way in the water with which they mix the flour into dough. The air-bubbles of carbonic acid gas spread through the dough, raise it up, and make it light. This is called aerated or unfermented bread. Bread is called fermented when yeast is used. The yeast is mixed with *luke-warm water* and stirred up in the flour, which contains sugar that the yeast feeds upon and changes into alcohol and the carbonic acid gas that spreads through the dough and makes it light. When all the sugar in the flour is eaten up the yeast gives up working. When dough is put into the oven it rises up for the first few minutes, because warmth makes the yeast grow, but the heat soon becomes so great that it kills it. You must watch the next baking-day and see how dough rises and puffs up on first being put into the oven,

and then remains still. The alcohol or spirit is sent out of the dough by the heat into the oven.

German yeast is the same as brewers' yeast, only it has been dried. Though it is called German yeast it is made at Rotterdam, a town in Holland, in the following way. The yeast is spread with a brush over a wooden board. When this layer is dry another layer is placed over the top of it until a thick cake is formed. If kept in a very cool, dry place, it is said that German yeast will keep for two years. It is very difficult to get good German yeast in the summer time, because the great heat kills it during the voyage, and then it becomes bad like any other dead and rotten vegetable. Cooks use a great deal more German yeast in the summer, because it often happens that only half of the yeast they put into the flour is living; the dead part of course gives the bread a disagreeable taste. I should think if fresh German yeast were put in a very clean jar surrounded by ice it could be preserved for some time during the summer, as cold stupefies the plant and prevents it from working. Yeast can be kept for a short time in a thick syrup of sugar, but we found it was necessary to take a large jar, because the yeast grew so quickly that it would soon have come out of the top or have burst the jar had it been corked up.

The air we breathe is full of the yeast plant. We know this to be a fact by the way wine is made. When all the juice has been squeezed out of the grapes it is put into a big open vat or tub, such as brewers use in making beer. The grape juice soon begins to ferment and contain a great deal of spirit and carbonic acid gas, though no yeast or anything else has been put in. The yeast falls into it from the air, as the vat is open. The juice in hot countries is just the heat the plant likes, and contains a great deal of sugar.

Plants like the yeast plant are called fungi, and it is said there are no less than 150,000 different kinds. The largest are mushrooms, which we eat and pickle. Thousands that float in the air are much smaller than even the yeast plants; 24,000 will only cover a square inch! They float about in the air when it becomes damp, and contains the kind of food they like. Some live in drians, others in bad water, milk,

or foods of any kind, and make them ferment, and turn sour, mouldy, or putrid. Professor Tyndall and many other learned men say that if we could prevent the air we breathe from getting into our meat or foods they would never go bad, as cooks say, or have an unpleasant smell, only crumble away in time, like a mummy that has been wrapped up so well that no air could get to the flesh. Preserved meats keep as long as the tin cover is fastened down, but directly it is opened the meat becomes unwholesome and putrid.

You would not think that these plants could get through an egg-shell, but they do. An egg-shell is covered with thousands of tiny holes, through which the fresh air enters for the little chicken to breathe. Well, through these holes the fungi send some long threads, and soon change the good egg into a rotten one filled with bad gases, which are light. A bad egg will for this reason float if put into water, and a good egg will sink to the bottom. If you want to keep eggs for some months in the winter you must either cover over the shell with grease, so that nothing can enter the holes, or put them into lime-water. A piece of quick lime is used for this purpose.

Preserves often ferment and sometimes burst the bottles, owing to the carbonic acid gas made by the fungi that were in the air in the bottles when the preserves were poured in. Our bottled fruit keeps perfectly, because our cook takes great care to use very hot, clean, dry bottles, fills them quite to the top, and covers them instantly with a bladder, or pours hot grease over the top or oil. We only use one pound of sugar to three pounds of fruit, and boil them for twenty minutes. Of course no preserves will keep unless the fruit is freshly gathered in dry weather.

Fungi cannot grow unless they have some water or moisture. Dry pure air shrivels them up. Preserves grow mouldy because they are put in a cupboard through which no dry air can pass. Bread grows mouldy if shut up in a damp pantry or in a jar through which air cannot pass. There is a great deal of moisture in bread, which should be able to pass out through a lid with holes, and the bread-pan should be kept very clean and dry, and be unglazed; then the

air can get through the pot and carry away the damp that rises from the bread. Damp walls are soon covered with the same kind of mould made by fungi.

How very different are these small invisible plants from the plants we can see, which bear green leaves and flowers that delight our eyes, purify the air in our houses, and live upon food they find in the earth, air, and water; while fungi feed on the foods we eat, called organic foods, and make them unwholesome and poisonous. It is a comfort to know that if our houses are very clean, have no dirty corners, and the windows are kept open and bright, so that plenty of sunshine and fresh air can enter, we shall not be troubled with fungi, because fresh, dry air contains a great deal of oxygen gas, and oxygen gas seems to kill or shrivel them up. If cooks understood the nature of these plants, they would take care to have very clean pans, leave no food in them, and make their larders and kitchens very sweet. Housemaids would also take care to remove all dust from the furniture, &c., and constantly shake the dusters out of the window, as dust is a favourite place for fungi. Professor Tyndall not long ago proved by a beautiful experiment that the air in crowded, unventilated rooms was full of organic matter and living things which feed on it.

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